The Scale and Extent of Political Economies of the Middle Bronze Age Jazīrah and the Bilād al-Šām (c. 1800-1600 BCE)

RATTENBORG, RUNE

The Scale and Extent of Political Economies of the Middle Bronze Age Jazīrah and the Bilād al-Šām (c. 1800-1600 BCE)

Rune Rattenborg

The present thesis investigates the material scale of six political economies distributed across the dry-farming plains and piedmonts of the Middle Bronze Age Jazīrah and the Bilād al-Šām. This is done using a comparative and interdisciplinary approach combining the large-scale analysis of administrative cuneiform texts with the compilation of relevant archaeological survey datasets. Drawing on theories and methods developed in landscape archaeology and historical sociology, the thesis builds a regional analysis of economic scale through a focus on three analytical units; the institutional household, the parent site, and the associated micro-region.

Based on a dataset extracted from c. 1500 administrative cuneiform texts from the six study sites, the analytical chapters present a comprehensive discussion of the socio-economic and technological context of chief agricultural and animal resources and the material scale of their production, manipulation, circulation, and consumption. These investigations are undertaken focusing on three spheres of social action, namely the urban neighbourhood, agricultural regimes, and livestock management. The analysis concludes by drawing together quantitative data on various aspects of the institutional household economy to assess its material scale relative to the subsistence needs of its parent site and associated micro-region.

The thesis demonstrates the limited material capabilities of a group of early political organisations relative to their social setting, both at the level of the parent settlement and, more forcefully, at the surrounding hinterland. It underscores the role of nascent political organisations as local and very resilient economic infrastructures across a politically volatile period of Bronze Age history. In line with recent and comparable investigations on Bronze Age economies, these findings offer critical revisions of traditional notions of the power of the early state. In methodological terms, the thesis formulates a novel means of combining large-scale analyses of text and material culture at a regional level, which can be applied in future studies.

The Scale and Extent of Political Economies of the Middle Bronze Age Jazīrah and the Bilād al-Šām (c. 1800-1600 BCE)

Rune Rattenborg

Submitted for the qualification of Doctor of Philosophy (PhD)

Department of Archaeology

Durham University

9 September 2016

Table of contents

Figures

Tables

Statement of copyright

Acknowledgements

Graham Philip is to be commended for starting me off on this path and for his willingness at all times to consider perspectives that might have been unorthodox, but eventually proved illuminating. Tony Wilkinson, taken from us much too soon, never ceased in instilling myself and everyone else who came to make his acquiantance with an unrivalled enthusiasm for his field. Penelope Wilson took up the challenge of making herself familiar with a thesis already far down the assembly line, and brought both encouraging comments and a watchful eye to see it through.

My sincere thanks are due to the Durham University Faculty of Social Sciences and Health for providing me with a 3-year Durham Doctoral Studentship, and to Vera and Tage Danielsen and Lene Sarup for their support in what eventually came to be a much longer concluding stage than anticipated. A number of funding bodies facilitated my participation in conferences, workshops, and stays abroad, namely the Elisabeth Munksgaard Foundation of the Danish National Museum, the Augustinus Foundation, Excellence Cluster Topoi, the Norwegian Academy of Sciences and Letters, and the London Centre for the Ancient Near East. I should also express my gratitude to the Department of Archaeology, the Centre for Academic and Researcher Development and the Institute of Advanced Studies, all of Durham University, for supporting a workshop on network models in archaeology held at Durham in October 2013.

Eva Cancik-Kirschbaum responded enthusiastically to an otherwise haphazard passing by her office in May 2013, and her views and suggestions added critical bearings and much-needed shape to many of the ideas presented here. I thank her, as well as the Institut der Altorientalistik and the Institut des Vorderasiatisches Archäologie of the Freie Universität Berlin, not least secretarial and library staff, for their willingness to help with issues large and small during a stay in Berlin in February and March 2014. David Warburton gladly shared his opinions on economic theory and the past in general, and infused my views with a healthy disrespect for many a disciplinary boundary. Eivind Heldaas Seland enabled my participation in a workshop held in Oslo in November 2014 that significantly improved upon my theoretical rigour and its application to historical matters. Julian Reade shared both in opinions and field notes on a much wider range of questions regarding the ʻAfār Plain than I could ever have wished for. Arsalan Othman Aljaf made an entire lake vanish before my eyes when he sent me a batch of aerial photographs with no questions asked. A host of other scholars, too many to mention, engaged in discussions on various aspects of the matters presented here. I am grateful to all of them.

Behind all these are the lasting influence and friendship of research postgraduates and staff at the Department of Archaeology whom I have been so fortunate to meet during the years. Jennie Bradbury guided my first insecure steps both into the world of landscape archaeology and studying abroad with care and understanding. Dan Lawrence offered ready and engaging opinions on a wide range of issues, a testimony to his inspiring character. Sofia Turk, Marco Nebbia, and Kristen Hopper should be singled out, as neither this thesis nor myself would ever have gotten anywhere without them. Many more brought insights from their various specialties. Grateful to all, I hope they will forgive me for not mentioning them by name. Friends and colleagues from beyond the Dawson Building offered inspiration from afar. Adam Anderson, while an ocean apart, is an unending source of stimulation and encouragement. Seraina Nett became a rare confidante in that strange exercise of squeezing administrative cuneiform tablets into an Excel-sheet. Anne Goddeeris brought a fresh, yet skilled eye to my understanding of Bronze Age managerial practices. And Rune Nyrup was always ready to tell me which philosopher I had unknowingly stumbled upon. Further afield, I should acknowledge the influence of Alan Walmsley and Stephen McPhilips, not only for helping my communicative English skills, but also for teaching me that reading cuneiform is no hindrance for digging a hole. Jesper Eidem for teaching me Akkadian and for spurring my interest in a region and a time period that I eventually came to devote an MA as well as a doctoral thesis to. And Gojko Barjamovic and Mogens Trolle Larsen for bringing, each in their own way, to my early exposure to cuneiform studies a broader historical and theoretical awareness. They, along with many other friends and colleagues in Copenhagen, have had a lasting impact upon my line of thinking, and consequently on the present work.

Vækkerforeningen af 1832, and the realm over which it presides, should be commended for demonstrating to me that social entities overlap, intersect, entwine, and sometimes fuse, in ways that defy simple or unitary explanations. Stine Lassen and Egil Bargfeldt should be commended for being as reliable seamarks as that proverbial rock of Gibraltar. And a quarter century down the line, I should thank Carl Hansen, a 50-year old bachelor with as many cows to keep him company for showing me the basics of farming as a child, and for teaching me to be patient.

While I doubt that he read much, save for the newspaper, I hope he would have appreciated the mundane aspects of this thesis with the quiet nod with which he usually gave his approval of things worthy of such. I cannot, after four years abroad, express in words how grateful I am to my family, Emma, Søren, Silje, Nis, Nis and Lene, Emil and Magnus, for their patience, encouragement, and love. And, finally, to Friede, the most decisive and able and kind and adorable peacemaker that anyone could ever hope to meet.

Abbreviations

AAICAB	*Archives Administratives et Inscriptions Cunéiformes* (Grégoire 1996)
Akk.	Akkadian
Ar.	Arabic
ARM	*Archives Royales de Mari*
ATaB	Alalah-Texte, altbabylonisch
BATSH	Berichte der Ausgrabung Tall Šeh Hamad/Dūr Katlimmu
CAD	Chicago Assyrian Dictionary
CAME	Corona Atlas of the Middle East
CB III	*Chagar Bazar (Syrie) III* (Tunca and Baghdo 2008)
CDLI	Cuneiform Digital Library Initiative
CH	Code of Hammurabi (cf. Roth 1997)
FI	Farmer's Instructions (cf. Civil 1994)
KTT	*Keilschrifttexte aus Tuttul* (Krebernik 2001)
OBTCB	*Old Babylonian Texts from Chagar Bazar* (Talon 1997)
OBTR	*Old Babylonian Texts from Tell al-Rimah* (Dalley *et al.* 1976)
RATL	*The Royal Archives from Tell Leilan* (Eidem 2011a)
REL	Revised Eponym List (cf. Barjamovic *et al.* 2012)
Sh I	*The Shemshara Archives 1: The Letters* (Eidem and Læssøe 2001)
Sh II	*The Shemshara Archives 2: The Administrative Texts* (Eidem 1992)
Sum.	Sumerian

Notes to the reader

Akkadian and Arabic terms are given in italics. Sumerian words and terms are given in normal case, and in versals when referring to graphemes. Transcription of Akkadian words and phrases in the main text, in appendices, and in database glossaries follows principal dictionaries, i.e. the *Chicago Assyrian Dictionary* and *Akkadisches Handwörterbuch*. Noun mimation is thus not given, except when transcribing from primary texts in which mimation occurs. Proper nouns, such as personal or place names, are generally given without vocal stress, except where these present themselves as obvious and generally accepted (e.g. Šamšī-Adad). Sumerian sign values follow those given by the *Pennsylvania Sumerian Dictionary*. Transliteration of Arabic proper nouns and terms follows conventions given in *A New Arabic Grammar of the Written Language* (Haywood and Nahmad 2003, 2-6).

Absolute years are given either as Before Common Era (BCE) or Common Era (CE). Middle Bronze Age year names, in this study chiefly from the Old Assyrian eponymal tradition, are given with reference to their placement in specialist catalogues (e.g. the Revised Eponym List cf. Barjamovic *et al.* 2012). Native calendars and the association of Bronze Age relative chronologies and absolute modern chronology is discussed in more detail in Appendix 3.

A comprehensive discussion of native metrological units, their tradition and interrelation, and their conversion into modern units is given in Appendix 2. The present study utilises a few base values for the conversion of ancient measures to modern ones, which should be noted from the start. First, it is assumed that one litre of grain equals 650 grammes of grain (see discussion by Paulette 2015, 45-46). It is further assumed that one litre of cereals has a nutritional value of 2,000 kilocalories (see Ellison 1981, Table 1, Schwartz 1994, Table 2, also Paulette 2015, 47). In discussions of quantitative data, this study is concerned primarily with capacity measures, the native units of which are given in the table below (Table 1.1). As outlined in more detail in Appendix 2, these are converted according to various interpretations of the *qû*, ranging from 1:0.8-1.6 *qa*/litre (18.4). As a rule of thumb, one *qû* should be considered roughly equivalent to one litre.

The present study contains a large number of graphs based on quantitiative information drawn from the textual database supplied in Appendix 4. In general, graphs include data from a given number of primary texts, the specific number of which are given in the graph header as t = x. The aggregate of the given variable, say, the aggregate amount of cereals, contained in the graph is given in the graph header as n = x. The meaning of Major IDs and their individual levels (e.g. L1, L2, L3, and L4) is explained in more detail in Chapter 5. Summary data on relevant text groups are given in relevant sections of Appendix 1.

Unit		
a-gar (*ugāru*)	1200	
gur (*kur*)	120	
anše (*imēru*)	100	
barig (*pānu*)	60	
baneš (*ṣimdu*)	30	
ban_2 (*sūtu*)	10	
$sila_3$ (*qû*)	1	= 0.8 ~ 1.6 litre
gin_2 (*šiqlu*)	$^1/_{60}$	

Table 1.1: Overview of capacity measures and their internal notation

Introduction

1 Approaching scale

This study investigates the scale and extent of institutional household economies of the Middle Bronze Age II (c. 1800-1600 BCE) dry-farming plains and piedmonts of present-day Syria, Turkey, and Iraq. Specifically, I focus on textual assemblages and settlement data relating to six study sites. These are, from west to east, Alalah (Tel Açana), Tuttul (Tall Bī'a), Ašnakkum (Tall Šāghir Bāzār), Šehnā (Tall Līlān), Qaṭṭarā (Tall al-Rimah), and Šušarrā (Tall Šimšārah). Drawing on administrative records concerned with the management of subsistence resources within institutional household organisations at each of these locales, the thesis investigates and evaluates the scale and extent of production and consumption of agricultural and animal resources within a comparable set of political economies. Based on associated settlement data derived from archaeological survey and remote sensing, I examine the scale of institutional household economies in the context of their parent settlement in isolation and their associated hinterland in aggregate.

My key aim is to formulate a comparative perspective on the material scale of Bronze Age political economies. As I demonstrate below, the economic power of the early state has for a long time constituted a foundational element in historical accounts on the rise of complex societies. But the central role of the political economy in such accounts is rarely enunciated with reference to a discrete analysis of its actual size. How big, in material terms, were the earliest state organisations? What aspects of agriculture, husbandry, manufacture and trade did they encompass? And how does the scale of these infrastructures compare to the economy of society in general? A more thorough synthesis on these questions may, potentially, add some important qualifications to reigning notions of state power and political agency within current archaeological and historical research on and in the pre-classical Middle East.

The analytical perspective advanced here is founded upon the comparable properties of the six study sites and the ability of specific elements of their textual and archaeological record to address these questions on a regional scale. In the following five chapters, I offer a thorough discussion first of the environmental and historical context of the study sites, second of my theoretical and methodological approach to the assembled archaeological and textual datasets. In concert, these chapters serve firstly to demonstrate the compatible environmental and historical characteristics pertinent to the six cases considered here, secondly to define a theoretical and methodological framework able to integrate archaeology and text within a regional and comparative frame of inquiry. Having established a working methodology, we can turn to the main part of the analysis, namely the tracing of economic infrastructures within the institutional household economy and the assessment of their material scale and extent.

1.1 Defining the institutional household

What I term the 'institutional household' goes under a variety of names in scholarly literature. I use 'institutional household' in reference to a particular form of social organisation that binds together intersecting networks of economic, political, and ideological agency within a tangible social and physical unit; the household. As I focus on economic aspects of this organisation, I regularly exchange 'institutional household' for 'political economy' in order to stress the more general association of a delineable economic infrastructure with a defined political entity. Both of these concepts evolve from terms native to the ancient world, e.g. Sumerian e_2, Akkadian *bītu*, and Greek *oikos*, all commonly translated as 'house' or 'household' (Gelb 1979, 1-4). The latter has a long history as a heuristic device in economics, sociology, anthropology, history, and archaeology. To late 19th century economic historians, *oikos* was an evolutionary stage in social and economic history, and thus as much a societal order as an organisational form (Rodbertus 1865, Bücher 1979 [1906]) As an analytical unit, *oikos* is often associated with German sociologist Max Weber, who used it as a principal element in his definition of the patrimonial social order. *Oikos* here refers to a social organisation focused on want satisfaction (Weber 1978, 381, see also Swedberg 2005, 182-183), and so differs from the related concept of the firm, which has profit as its key aim.

Related concepts have been championed by a century of archaeologists, philologists, and historians, characterised on an economic level by the notion that "everything that is consumed in a household (*oikos*) has also been produced and processed within it" (Renger 1991, 192). It underlies the social topoi of the 'great organisations', namely the temple and the palace that figure so prominently in many general archaeological and historical readers (e.g. Oppenheim 1964, 95-109, Postgate 1994, 109-154, Pollock 1999, 117-123). A closely related concept is the 'palace economy' (*Palastwirtschaft*) typical of Early Bronze Age society, which designates a societal form (*Gesellschaft*) where the "vast majority of the population is directly related to a central institution, that is, integrated for example through dependence on tributary obligations” (Renger 2003, 276). Detecting increased levels of economic fragmentation during the Middle Bronze Age, some scholars have advanced a narrower definition for later periods, namely *Palastgeschäft*, for which ‘palace enterprise’ is a rather unsatisfactory English translation (Renger 2000, van de Mieroop 2007, 93-94). Jakob qualifies his use of an *oikos*-based model with reference to the dissociation of several areas of economic activity from the workings of the political economy observable in the Late Bronze Age. Agricultural production, for example, was now more regularly outsourced to private agents, while the palace exercised formal power within wider social networks of interaction and trade (Jakob 2003, 24-25). Still, he sees the Late Bronze Age state as essentially a ‘palatial state’ (*Palaststaat*), and the application of an *oikos*-based model as overall validated by the evidence. Postgate recognises the resilience of the household as a social frame in Middle Assyrian political structure (Postgate 2013, 1-2). The entwined notions of economic and political organisation emerging from perspectives surveyed above underscore the proximal nature of institutional household economies and early state polities. For better or for worse, this relationship has instilled an almost seamless equation between ‘state’, ‘palace’, and ‘temple’ in Ancient Near Eastern scholarship (van de Mieroop 2004, 55). At a societal level, these interrelations are borne out in a seminal study by Schloen, who sees the household not only as a fundamental unit of everyday economic organisation, but as an ideational and normative institution encompassing most aspects of political and ideological agency in society at large (Schloen 2001, consider critical comments by Stone and Kemp 2003).

1.2 Theories of the political economy

This brief survey indicates that the institutional household is and has for a long time been integral to our understanding of economic and social structure in the Bronze Age Tigris-Euphrates drainage. This point is further substantiated when turning to theoretical perspectives on the ancient economy. Weber recognised the pivotal role of institutional household economies in Bronze Age communities in the Iraqi alluvial zone more than a century ago (Weber [1909] 1976). Soon after, studies on the economic and organisational structure and scale of the 25th century BCE Ba-u$_2$ Temple of Lagaš led scholars to conclude that Early Bronze Age temple households effectively controlled the entirety of the social economy and – consequently – society (Schneider 1920, Deimel 1931, 71-113). The temple-state model, as it came to be known, was long-lived (Falkenstein 1954, 1974, Koschaker 1941, 1950) and steered perspectives on economic, political, and social history for decades. Though soundly refuted as relying on isolated and highly partial bodies of textual source material (Diakonoff 1952, Gelb 1969, Powell 1977, Foster 1981), the omnipotence of the temple-state persists also in current literature (as pointed to by Snell 1997, 149, Prentice 2010, 9-11, see Avilova 2012, for a telling example). It also came to inspire broader sociological views on the past, e.g. through Wittfogel's *Oriental Despotism* (1957), which drew explicit lines between the powers of 'hydraulic states' and the Marxian Asiatic Mode of Production, and argued for the rise of the totalitarian state from the need for coordinated management of social infrastructures, e.g. irrigation systems (Bailey and Llobera 1981). Aspects of this work found their way into archaeological and anthropological thought, notably the theory of multi-linear social evolution (Steward 1977) and as a cue to the environmental circumscription of Harris' views on cultural materialism (Harris 2001). Again, later research did away with much of the material basis for the 'hydraulic state'. Several authors demonstrated that the rise of states preceded, rather than succeeded, the appearance of large infrastructural complexes (Adams 1965, Carneiro 1970). And yet, the luring image of irrigation works as a catalyst of state control continues to form part of more recent discussions of Bronze Age social organisation (e.g. Warburton 1997, Charpin 2002, Manning 2002).

The institutional household economy appears again in the works of Karl Polanyi, here in particular as the vehicle of redistributive exchange in a theory of pre-capitalist economies that came to be named 'substantivism'. Polanyi's views on economy in history, manifest in the edited volume *Trade and Market in the Early Empires* (1957) and the later monograph *The Livelihood of Man* (1977), revolved around the social integration of economic processes, namely that the movement of things in the process of economic action is integrated into a system of social relations or institutions (Dale 2010, 114-115). These are reciprocity, redistribution, and exchange. Reciprocity constitutes a symmetrical form of transaction, institutionally situated within the community, while redistribution is centric, and is typically associated with the locus of the state or a similar type of organisation. Exchange is associated with market economies, namely the transfer of materials within a social continuum unrestricted by institutional correlates, to which the common orthodox economic concepts of price mechanisms, utility maximisation and supply and demand apply (see for a recent and concise review of these concepts as analytical tools Prentice 2010, 5-6). In archaeological theory, these three modes of economic interaction came to be associated with specific social orders, e.g. reciprocity with tribe, redistribution with chiefdoms, and exchange with early states (e.g. Flannery 1972, Fig. 1, for the general persistence of this pattern, see e.g. Diamond 1997, 268-269, Renfrew and Bahn 2012, 170-173). Though Polanyi did not perceive of his economic types as cognates of a certain social or political order, his ambiguity in spelling out their role in this respect allowed for occasional integration with neo-evolutionary models (Dale 2010, 120-123). An agreement between a particular social formation and a particular economic order does, however, not follow from substantivist theory without qualification, and the theory itself does not provide for a causal explanation of how one economic order would develop into another, nor indeed define the rise of a particular societal form. Be that as it may, Polanyi's position on the economy of the Bronze Age Ancient Near East echoed the then-not-so-distant notions of the all-powerful palace or temple and the totalitarian despots conjured by the image of the hydraulic state. Substantivist economic theory postulated a total absence of market exchange in Bronze Age societies of the Ancient Near East, and pointed instead to the redistributive powers of the larger households as the principal forces of economic structure. These assertions were maintained and extrapolated by a later generation of historians, most eloquently by renowned Classicist Moses Finley (Finley 1985, 28, see e.g. van de Mieroop 1999, 118-120).

1.3 Perspectives in current scholarship

Remnants of these debates are still with us also because they relate to analytical paradigms that have proven hard to dismantle. Classificatory schemes of neo-evolutionary theory, as just demonstrated, have on regular occasions served to enforce a notion of the institutional household as a driving force in social history, even though social evolution has itself taken major hits recently (Pauketat 2001, Smith 2003, Yoffee 2004). Cuneiform specialists, pointing to the ample evidence of trade and market exchange in the written record, attacked the substantivist emphasis on omnipotent redistributive economies repeatedly and unrelentingly (Veenhof 1972, 348-351, Powell 1977, 1978, 1999b, Muhly 1980, Yoffee 1981, Gledhill and Larsen 1982). Yet many of these critiques reeled towards the imperative of historical empiricism. Rather than engaging with the analytical problems produced by rejecting parts of or all of Polanyi's paradigm, a good deal of cuneiform specialists resorted to the purported factuality of the textual record, and left it at that (Warburton 2009, 67, Jursa 2010, 15). Novel developments in economic theory, especially in archaeology and anthropology, have attempted to move the field of Ancient Near Eastern studies beyond the deeply entrenched paradigms of redistribution and state control by focusing on spatial and temporal variability in types of economic organisation (see e.g. Yoffee 1995, Stein 1998, 2014, Earle 2002, Smith 2004). Even so, the notion of the powerful, redistributive economy of the institutional household and the early state is still a living element of quite recent general overviews (Liverani 2005, 50, Renger 2007, 188-189), and a working variable in societal or systemic paradigms of processualist or functionalist approaches still common in Ancient Near Eastern research (Matthews 2003, 19-26, also Trigger 2007, 437-439).

One reason for these divergent perspectives is the inchoate integration of studies of text and material culture at various levels of academic inquiry (Postgate 1990, Zettler 1996, 2003b, 2003a, Zimansky 2004, also Andrén 1998, Moreland 2001). Even if the cuneiform corpus ranks among the largest bodies of historical evidence known (Streck 2010), its study is still largely undertaken with philological or traditional historical aims. There are notable exceptions, of course. The work of the Sumerian Agriculture Group in the 1980ies and ‘90ies still forms a unique example of the potential gains of interdisciplinary views on the cuneiform record (Powell 1999a). Recent collaborative projects have made good use of texts as a source of information on issues of technology, diet, crop regimes, and land tenure (Matthiae and Marchetti 2013, Wilkinson *et al.* 2013b). Less extensive, but equally important individual contributions have further explored potentially rewarding interfaces between text and archaeology (Reculeau 2011, Casana 2012, Ristvet 2012).

Scalar perspectives on the institutional household have generated some interesting studies bridging philology and landscape archaeology in recent decades. A study of the institutional economy of 21st century BCE Umma pointed to tillage capacity as a useful variable for measuring institutional scale relative to overall population figures (van Driel 2000b). A similar approach was adopted in a later investigation of the palace economy at 25th century BCE Tall Baydar in the Khabūr Basin (Widell 2003, further extrapolated in Widell *et al.* 2013a). Recently, a comparative study of textual sources and survey data from the latter site and from contemporary Lagaš in the southern alluvium has offered further refinement to the study of relative economic scale between an institutional economy and its hinterland (Sallaberger and Pruß 2015). In pointing out commensurable types of information emerging from the textual sources and material culture, such perspectives also illustrate some interpretational constraints in the majority of recent text-based studies on institutional households. Otherwise excellent analyses of cuneiform assemblages deriving from institutional households deal in much detail with social structure, the interrelation of subordinates, rulers, the various managerial offices and their various economic responsibilities, yet without coherently addressing the material scale of the activities which the texts themselves were often made to document (e.g. van de Mieroop 1992, Zeeb 2001, Goddeeris 2002, Jakob 2003, Prentice 2010, Postgate 2013). While expressions of a sound and thoroughly tested philological practice, the proximity between synthesis and text tends to lock information at a level too particular for broader comparative syntheses. The demanding level of academic specialisation required in dealing with this material further bars cuneiformists from engaging actively with broader issues of social history (van de Mieroop 2013, 85-86).

1.4 Critical concerns: space, time, and scale

The present study offers several novel perspectives on the issues presented above. At a methodological level, I develop an interdisciplinary and comparative approach to the analysis of the institutional household throughout the Bronze Age Ancient Near East. Merging a perspective on regional landscape history with the minutiae of cuneiform documentation, this approach serves to formulate methods by which to investigate and compare aspects of material scale and social organisation from a spatially and temporally extensive selection of historical examples. At the empirical level, I focus on a series of cases from the Middle Bronze Age II dry-farming plains and piedmonts straddling the Bilād al-Šām, the Jazīrah, and the Zagros foothills that are both historically contemporary and furthermore situated in comparable environmental and social contexts. Less intensively discussed with regards to institutional household scale, this group of historical examples forms a useful counterweight to the constrained empirical basis that underlies traditional views on the power of Bronze Age institutional household economies. Traditional key examples, as seen above, are drawn from a handful of sites in the southernmost reaches of the Iraqi alluvium, and mostly confined to the latter half of the Early Bronze Age (c. 2500-2000 BCE). Emerging conclusions are often applied on a regional scale, however, even though such generalisations may obscure local trajectories (Galiatsatos *et al.* 2009, 1-2). At the analytical level, I pursue and develop recent perspectives on material scale rather than social structure, abiding by the old, but still rather relevant assertion that the most seamless integration of textual and archaeological perspectives are to be found in the study of technology and economic practice (Hawkes 1954). Using a data structure focusing on the spatial and temporal location, type, and quantity of a given material resource appearing in administrative cuneiform records, I propose a simpler and spatially and temporally more versatile approach to the study of institutional scale, capable of juggling a vast body of textual sources unconstrained by localised and diverging practices of recording and ordering information.

Together, these perspectives offer important correlates to current views on the economic power of the Bronze Age political economy. First, the thesis takes a coherent approach to the wider environmental and historical setting of a general study region, bringing together settlement data and cuneiform assemblages from a wide transect of Bronze Age society. By carefully outlining environmental variables and historical trajectories within a defined study region, I define basic commonalities between the various study sites to strengthen a regional analytical perspective. Second, this wider regional perspective facilitates scalar comparison, between organisations and between their associated parent site and micro-region. As seen above, a number of recent studies have demonstrated the viability of quantitative analysis of economic scale through an integrated study of texts, site size, and population figures, but these remain constrained to one or, in rare cases, two historical examples. Without a larger sample, conclusions inevitably become vulnerable to local circumstance. Third, an emphasis on material scale introduces another perspective on economic power that is not often consistently addressed in historical research (Escalona and Reynolds 2011, Robb and Pauketat 2013). As this study will show, an analytical focus on the *scale* of economic infrastructures introduces a variable capable of bridging archaeological and textual datasets on a regional level, and further demonstrates a surprising degree of quantitative agreement between the individual historical cases under consideration. As such, the concluding parts of this thesis argue that we can, in fact, define the material power of an early state economy with a substantial degree of certainty. And consequently consider its material impact and shaping power upon early complex societies on a much firmer, empirical basis than has hitherto been the case.

1.5 An outline of the present work

The structure of the thesis is laid out to define first the broader environmental and historical characteristics of the study area, second the pertinent datasets relating to the six study sites, the methodology adopted in their analysis, and the underlying theoretical position of this approach. Third follows the actual analysis, discussion, and conclusion. The remainder of this section presents first a thorough outline of the physical landscape (Chapter 2) and the historical context (Chapter 3) in which the six study sites are situated. In the second section, I define first a schematic approach to my understanding and interpretation of archaeological landscapes and social organisations (Chapter 4), followed by a discussion of textual sources used in this study along with a description of the data structure used in their analysis (Chapter 5). These two sections serve then to define first an environmental and historical frame for the chosen empirical basis and their comparative analysis, and the theoretical and methodological outlook adopted in their analysis.

In the third section, I analyse the amassed textual dataset according to a tripartite interpretational framework, focusing respectively on urban institutional organisation and resource consumption, agricultural regimes of production and field management, and livestock rearing and exploitation. My chief aim throughout this section is to situate resource types emerging from the written record in their specific environmental, technological, and social setting, espousing what Halstead has recently termed a 'middle-range' approach to the basic elements of pre-modern patterns of subsistence (Halstead 2014). In the first of these chapters (Chapter 6), I discuss the processing and consumption of grain, flour, bread, beer, fat, sweeteners, and wine, and the general outlines of human subsistence as seen through the administrative record of the institutional household economy. In the second (Chapter 7), I consider crop regimes and field management, and logistical constrains on agricultural production within the institutional economy. In the third (Chapter 8), I look at the types of livestock reared and how these were exploited, and add some consideration of their relative importance to agriculture and subsistence. In the fourth and final chapter (Chapter 9), I draw on the findings of the entire section in combination with archaeological survey data to provide general estimates of the scale of the institutional household economy according to specific variables, namely production, consumption, and infrastructural capacity. The last section contains discussion (Chapter 10) and conclusions (Chapter 11), along with considerations of further perspectives. The four appendices provide a more comprehensive overview of core data employed in the thesis. Appendix 1 (Site Biographies) includes data on the individual study sites, associated survey datasets and a discussion of their micro-region, and finally a review of the archaeological and historical context of individual cuneiform assemblages associated with the study site. Appendix 2 (Metrology) gives a thorough overview of relevant metrological units, their history and regional distribution, and their conversion into modern units as adopted in the analysis of the specific parts of the dataset. Appendix 3

(Chronology) offers a brief discussion of Middle Bronze Age calendrical systems, their association with absolute chronology, and their use in administrative cuneiform records. Appendix 4 (Database) gives a brief introduction to the textual data and the database used in their analysis (discussed also in 5.2). A copy of the database is attached to the thesis.

2 Natural environments

Any study of social landscapes of the Ancient Near East must be founded upon a coherent understanding of the natural environment (Postgate 1994, 3, Wilkinson 2003, 7-10). The current section traces the principal characteristics of the natural landscape in which the study sites are situated through a survey of topographic outlines, geological formation, climate variables, general ecological zones, and the variety of zoological and botanical regimes contained within them. Reaching from the Orontes and Middle Euphrates river valleys and across the plains of the Jazīrah and into the hilly locales of the Zagros foothills, the six study sites inhabit a variety of environmental niches, counting fertile upland basins, undulating steppe, and riverine environments well into the arid fringes of the Arabian desert. A comprehensive understanding of the environment of the Middle East demands consideration of a range of global, regional, and local factors. The following outline focuses on the area encompassed by the modern nations of Syria, Iraq, and parts of Turkey, but I make occasional digressions to aspects pertaining to the Middle East in general, including the Mediterranean, North Africa, the Arabian Peninsula, and Iran. Subsequently, we will consider individual ecozones of relevance for the study area in more detail.

2.1 Topography

The Middle East is the product of a complex geological history. Relief, here perhaps more than anywhere else in the world, exhibits a key influence on environment and the shaping of human settlement and interaction (Zohary 1973, 4-7, Beaumont *et al.* 1976, 17-19). Broadly speaking, the region can be divided into a northern mountainous zone, part of the Alpide belt that stretches across Europe and Asia. This zone is bordered to the south by a relatively uniform plateau reaching from the mountain ranges along the Eastern Mediterranean to the Persian Gulf. Further south, we find the highland massifs of the Sinai and the southwest Arabian Peninsula (Figure 2.1). These divisions are intimately related to the geological history of the wider region. The Taurus and Zagros ranges that traverse Turkey, Armenia, and Iran were formed through the folding of the tectonic plates of Iran and Anatolia at their convergence with the subducting Arabian Plate during the Miocene Epoch (23-5.3 Ma). The mountains form an imposing barrier between the Anatolian and Iranian plateaus and the Arabian Peninsula, stretching from the Mediterranean in the west to the Persian Gulf in the southeast (Wilkinson 2003, 15-16).

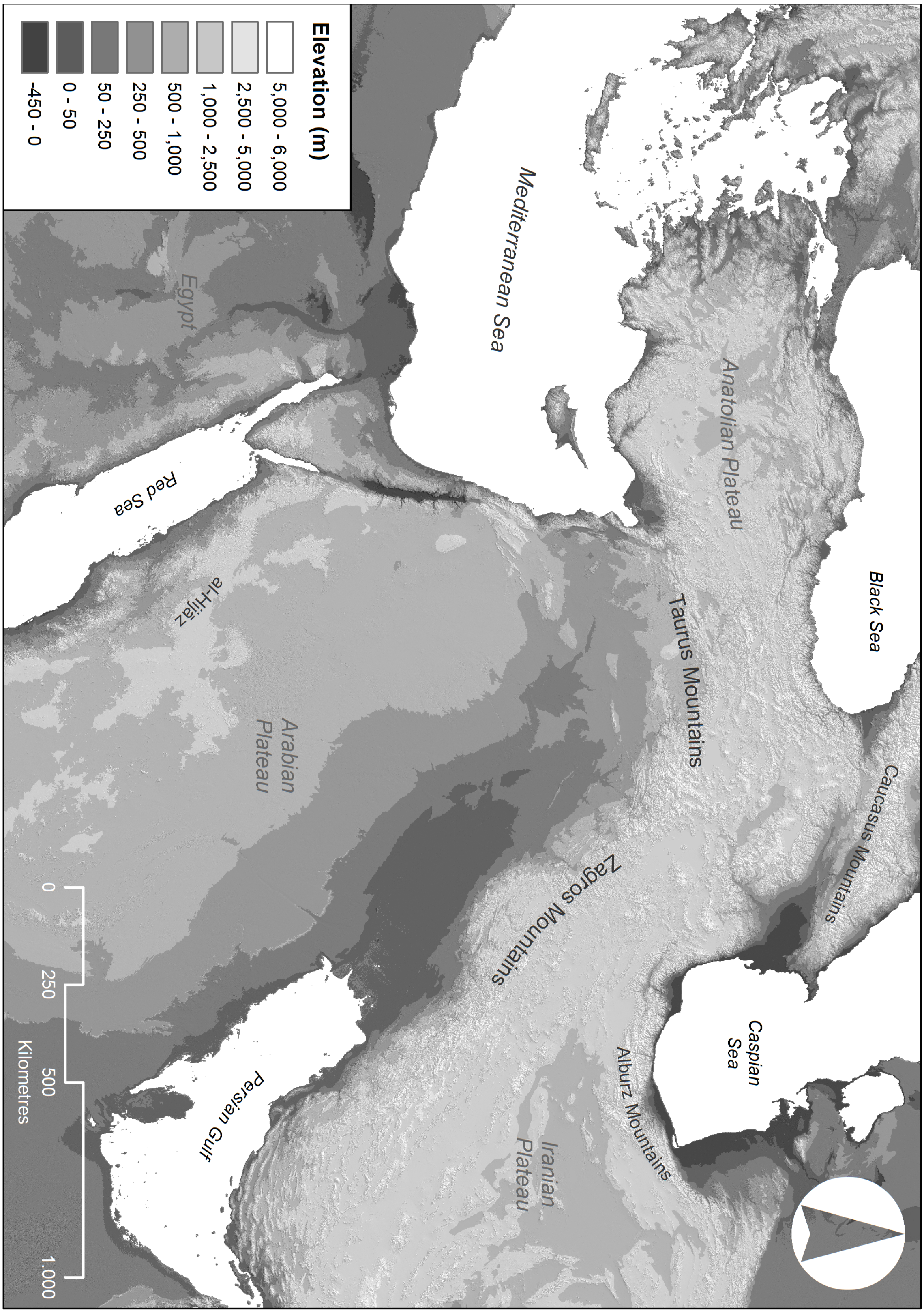


Figure 2.1: Topographical map of the Middle East

The highlands of Yemen, western Saudi-Arabia, eastern Egypt and central Ethiopia are considerably older, and part of formations of the Paleozoic Era (541-252 Ma) broken apart during the northward movement of the Arabian Plate (Beaumont *et al.* 1976, 23). The same geological history is accentuated in the west by lateral tectonic activity between the African and Arabian plates along the Dead Sea fault. The resulting depression, reaching more than 700 metres below sea level at its extreme at the bottom of the Dead Sea, extends through the Amuq, Ghāb, Biqā‘ and Jordan valleys from the Cilician Plain to the Red Sea at ‘Aqabah. This depression is separated from the Mediterranean coastal plain by the low hills west of the Jordan, those in Galilee, and further north by the Lebanon and the Syrian Coastal Mountain Range. To the east, the highlands of the Hijāz, western Jordan and the Anti-Lebanon or Eastern Lebanon Mountain range demarcate the inner steppe and desert of the Arabian Peninsula from the coastal regions and the plains of Bilād al-Šām (Wirth 1971, 41-42).

As the Arabian Plate descends below the Iranian Plate along the Zagros mountain range, general declivity of the region, illustrated also in the alignment of major drainage systems, is aligned from the north to south or west to east. From below the ridges of the Hijāz, the mountains of the Bilād al-Šām, and the Taurus and Zagros ranges the landscape declines relatively evenly from around 500 metres above sea level towards the Persian Gulf. In contrast, the coastal plain towards the Mediterranean comprises a relatively narrow strip entrenched between the sea and the mountain slopes west of the Dead Sea depression. Within the montane arc that stretches from the Red Sea to the Taurus and eastwards towards the Zagros, the region is characterised by the topographical uniformity of the Arabian Plate and more recent morphological changes brought about by erosion and sedimentation. Apart from the extensive piedmont regions below the Taurus and the Zagros, occasional variation in relief further south is the result mainly of anticlinal formations associated with the aforementioned tectonic activity. A line of low mountains, namely the Jabal al-Ruwāq, Jabal Abu Rujmayn and Jabal Bišrī follow the western fringe of the Syrian Desert from Damascus over the Tadmūr oasis to the Euphrates. In the Jazīrah, a similar formation separates the Khabūr Basin from the drier steppe to the south, notably Jabal ’Abd al-’Azīz and Jabal Sinjār, followed by the Jabal Hamrīn on the eastern side of the Tigris (Wirth 1971, 41-42). The latter has historically formed a boundary between the plains below the Zagros and the Tigris-Euphrates alluvial fan south of Tikrīt.

2.2 Geology

Geologically, this region encompasses a wide terrace of rolling terrain formed by Cretaceous and early Paleogene (or Tertiary) (145-23 Ma) deposits, mainly limestone and sandstone. Occasional, and sometimes substantial basaltic fields are the result of Late Miocene to Early Pleistocene (11.62-0.78 Ma) volcanic activity, notably the basalt fields of the Harrat al-Šāmah south of Damascus, north of Himṣ, along with smaller areas east of al-Raqqah and in the central Khabūr Basin (Wirth 1971, 57-60, see Bridgland *et al.* 2012, 45-46 for a recent revision of the age of basaltic fields around Himṣ, for similar studies on volcanic activity in the Jazīrah, see Demir *et al.* 2007a). A number of alluvial basins are spread across this area, notably at the headwaters of the Khabūr and Balīkh rivers, but also the Saruj, the Jabbūl, and the Amuq. The troughs of perennial and seasonal streams criss-cross the plains, with major rivers being the Euphrates and the Tigris and their tributaries. Over time, the Euphrates and the Tigris formed deep river valleys flanked by higher lying terraces along most of their course through Syria and western Iraq (Demir *et al.* 2007b). Roughly around Baghdad, the rivers enter the alluvial plain, essentially a massive fluvial fan deposited in the geosyncline depression along the edge of the Arabian Plate. Given the extremely low relief (the alluvium rises less than 50 metres above sea level across a distance of some 500 kilometres from Baghdad to the Persian Gulf), the rivers create only ephemeral troughs on their way towards the sea, often, and sometimes quite abruptly, shifting their course back and forth across the plain (Potts 1997, 6-11). The principal water system of the Bilād al-Šām centres on the Orontes, which originates in the central Biqā valley and runs north through the Himṣ plain and along the eastern flanks of the Coastal Mountain Range, before turning west through the basin of the Amuq towards the Mediterranean. Further south, the courses of the Lītanī and Jordan rivers follow similar topographical outlines. The former flows through the southern Biqā and then west towards the Mediterranean, the latter towards Lake Tiberias and thence to the Dead Sea.

Soil regimes relate firstly to the geological history, secondly and importantly to geomorphological changes brought about by sedimentation and erosion, chiefly in relation to major drainage systems (Beaumont *et al.* 1976, 25-27). As we can observe a direct relationship between Bronze Age settlement patterns and soil composition, particularly within the aforementioned alluvial basins, this also allows us to pinpoint zones of potentially intensive agricultural activity (Wilkinson and Hritz 2013, 14-16). The soil horizon within our study area can be referred to three different types, to which some additional, localised particular formations should be added (see here Beaumont *et al.* 1976, 33-46, FAO 1977, Straub 1988, IUSS 2014). The western Bilād al-Šām is characterised by luvisols (e.g. terra rossa) in and along the Jordan and Lebanon highlands and the Coastal Mountain Range, a band that extends northeast and east along the Taurus foothills. Very supportive of forests, orchards, agriculture and pasture alike, luvisols are prone to rapid degradation and erosion when robbed of vegetation cover. Further east, in the Mosul and Erbil plains, a belt of chromic vertisols, characterised by high clay content, extends across the plateau between the Zagros foothills and the Jabal Hamrīn. It provides for good agricultural land and pasture, but holds less potential for substantial tree growth. The higher level of aridity south of these zones is the main factor in the generation of steppe and desert calcisols, exhibiting a higher secondary concentration of carbonates. The transition from one zone to the other is also dependent on past intensity of deforestation and subsequent erosion. If irrigated and drained, much of the Jazīrah calcisols can provide good agricultural land, while areas with sufficient precipitation can provide decent pasturage. In harsher environments, as one moves south towards the dry steppe and desert, salt flats occur, caused by lack of drainage and increased moisture evaporation, resulting in the formation of saline crystals in the soil crust. In the Jazīrah, such areas, characterised by solonchak (Russian for 'salt marsh') soils, are primarily associated with endorheic drainage zones (enclosed basins that retain collected surface water) such as the Wādī Ṯharṯhār. Similar characteristics apply to the Jabbūl southeast of Aleppo, and parts of the Jordan Valley floor around the Dead Sea form another obvious example. Though largely inhospitable, salt flats and endorheic basins would have formed primary sources for the extraction of salt (Potts 1984). Major river courses exhibit substantial fluvisol deposits, rich in nutrients and historically some of the agriculturally most productive soil regimes in the region. These are then, naturally, found in the Euphrates and Tigris river valleys, and in more localised contexts in the troughs of their tributaries, though increased salinization may also occur in zones with insufficient drainage.

2.3 Climate

Climate within the Middle East, and more narrowly across the plains of Syria and Iraq, is the result of the complex interplay of global weather systems, regional location, and local relief. Today, the wider region is characterised by cool, wet winters and dry, hot summers. Northern and western areas, i.e. the Anatolian plateau, the Bilād al-Šām and the plains south of the Taurus range, receive most of their precipitation from depressions moving west from Europe and the Mediterranean during the winter, while subtropical weather currents from the south provide for the very dry summers (Beaumont *et al.* 1976, 49-55, Wilkinson 2003, 17-19). With the main moisture bearing weather systems coming from the west, topographic relief has an important impact on variability in local levels of rainfall (Figure 2.2). The coastal mountain ranges of Lebanon and Turkey receive the highest level of winter precipitation, with decreasing levels as one moves inland and further east (Wirth 1971, 70-71, Moore *et al.* 2000, 45-47). Precipitation levels in the mountains range from up to 1000 mm per year close to the Mediterranean and in the Taurus to 500 mm in the central Zagros. Upland basins, such as the Amuq, Rānīah and the Šahrizūr experience comfortable annual rainfall at 500-600 mm. As one moves south into the plains above the alluvial fan of the Tigris and Euphrates, annual levels of precipitation drops accordingly, from an approximate 500 mm below the mountain ranges to less than 100 mm in the desert. Because of the high level of variability in annual precipitation levels observed in the region, further compounded by the fact that the most irregular months of the pluviometric year coincide with sowing in the autumn and ear-formation in early spring, the marginal zone of sustainable dry-farming is highly variable (Reculeau 2011, 14-15, cf. Sanlaville 1990, 6). Sustained dry-farming, at least for sedentary communities, would have been dependent on a more stable long-term average, suggesting that the 250 or even 300 mm isohyet provides a more realistic point of reference (Bottema and Cappers 2000, 38, see also van Oosterom *et al.* 1993, for recent archaeological perspectives on the impact of precipitation variability upon settlement patterns in the general region, see Lawrence *et al.* 2015). Beyond this line existed a broad zone with the potential to support continuous farming without recourse to irrigation, but with equal risk of severe drought at regular intervals. The development of adaptive subsistence strategies based on supplementary barley cultivation and livestock pasture as a means of exploiting environmentally marginal areas in the drier steppe is one apt reflection of regional environmental constraints (Wilkinson *et al.* 2014, 53-54).

Water flow in major drainage systems depended critically on precipitation. The Orontes emanates from karst springs in the central Biqā, yet its flow is augmented further along its course by runoff from the Lebanon and Anti-Lebanon ranges. Water flow in the Tigris-Euphrates drainage stems from winter precipitation and snowmelt in the Taurus and Zagros mountains, with peak discharge in early spring. Entering the plain, the Euphrates receives additional flow from its tributaries, namely the

Sajur, the Balīkh and the Khabūr. Though likewise reliant on precipitation and snowmelt from the Taurus and Zagros ranges, the Tigris receives extensive additional flow from tributaries emerging in the Zagros range, especially the Greater and Lesser Zāb and the Diyala rivers.

2.3.1 Historical climate change: a brief survey

Climatic variation through time is another factor to take into account. Current scholarship now generally agrees that the Middle East has seen substantial climatic change over time. The scale, intensity, and duration of these variations are, however, subject to much debate, and can be approached through consideration of a number of different datasets (see for overview of discussions pertaining to the Bronze Age e.g. Kuzucuoğlu 2007, Wossink 2009, 15-26, Reculeau 2011, 27-59, Kalayci 2013, 13-17). Global proxies, namely ice cores from Greenland and sediment cores from the North Atlantic, are capable of demonstrating fluctuation in levels of general aridity, which has some bearing on regional climate in the eastern Mediterranean given the prevailing precipitation cycles outlined above. With respects to inland Bilād al-Šām and especially areas further into the Jazīrah, it remains difficult to consistently relate periods of global and local variations due to the complex dynamics played by topographical relief and climatic systems further east (Staubwasser and Weiss 2006). Climate proxies derived from sediment cores in lakes and marine environments, namely from the Oman Gulf (Cullen *et al.* 2000) and the Dead Sea (Migowski *et al.* 2006) and from stable isotope analysis of speleothems from Soreq Cave (Bar-Matthews *et al.* 1997, Bar-Matthews *et al.* 1999), allow for a higher degree of spatial and temporal resolution. While largely agreeing with global climate indices, regional proxies have illuminated climatic trends specific to the Middle East, which may be related to archaeological sequences and historical events (e.g. Bar-Matthews and Ayalon 2011). Recalling that the vast majority of water-flow in the Tigris-Euphrates drainage stems from snowmelt in the Taurus and Zagros mountains, proxies derived from sediment cores in Lake Van in eastern Turkey can take us even closer (Wick *et al.* 2003). Similar investigations from Lake Zeribar (Stevens *et al.* 2001) and Lake Mirabad (Griffiths *et al.* 2001) in western Iran provide data from areas further removed from the Mediterranean, and in turn more exposed to climatic dynamics from Central and South Asia. Collating proxy datasets allows us to correlate localised and regional climatic trends, and to recognise historical oscillations between drier and wetter conditions throughout the Holocene.

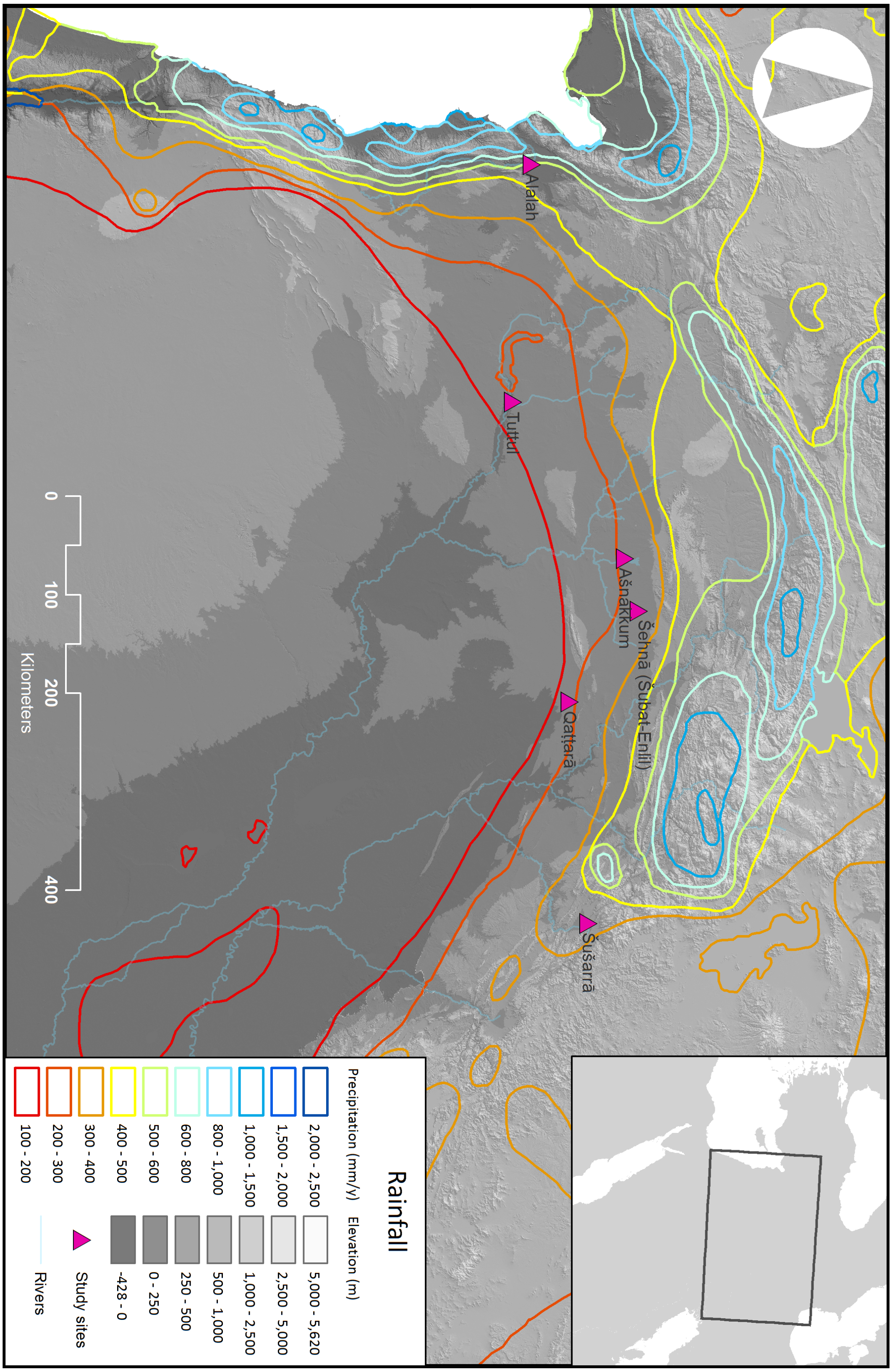


Figure 2.2: Modern average annual precipitation in the Middle East

Recent syntheses have outlined general change in climatic conditions within the Middle East and the Eastern Mediterranean as a gradual increase in aridity from the mid-Holocene onwards, yet punctuated by occasional periods of drought or increased humidity. Climatic conditions following the Younger Dryas, ending roughly around 9000 BCE, were characterised by a wetter climate than today. Pollen analyses suggest more extensive forest cover around this time in the coastal regions of the eastern Mediterranean (Roberts *et al.* 2011, 156-157). Woodland environments expanded gradually in drier regions inland and to the east, with peak values observed around 4000 BCE, and even later for the Zagros mountains (Roberts *et al.* 2011, 157, but consider also Moore *et al.* 2000, 78-81). Neolithic and early Chalcolithic communities enjoyed higher levels of humidity and better access to water resources, while increasing aridity is mainly observed from the 3rd millennium BCE onwards and especially after 2000 BCE (Finné *et al.* 2011, 3162, Finkelstein and Langgut 2014, 234, Langgut *et al.* 2015, 230-231). Drought spells towards the end of the Early Bronze Age are clear in a number of datasets, but their direct impact on social structures and subsistence patterns may be debated (Riehl 2012, Smith 2012, 225-226, Ur 2015, 75-76). Relatively increased levels of humidity during the Middle Bronze Age eventually gave way to increasingly drier and more arid conditions culminating around 1100 BCE (Langgut *et al.* 2015, 228-229). The scale and impact of climatic variation on human settlement, especially in the short term, remains debated, as does the extent to which humans have themselves contributed to environmental degradation (Wagstaff 1985, 214-232, Wilkinson 2003, 26-29, see for an insightful study of the historically variable impact of agriculture upon landscape in the Bilād al-Šām` e.g. Casana 2008).

2.4 Biomes

From this general outline, let us try to relate more localised environmental configurations to the individual study sites. Biomes correspond strongly with topography and precipitation, though environmental degradation has brought about significant changes since the mid-Holocene. The study region can be divided into a range of distinct ecological zones depending on defining criteria (Table 2.2), in general distinguishing between mountain, woodland, steppe, and desert regions or between levels of precipitation and access to surface water (see e.g. Wirth 1971, 99-107, Zohary 1973, 18-38, Moore *et al.* 2000, 49-72, Wilkinson 2003, 18-19, Reculeau 2011, 17-26, Wilkinson *et al.* 2014, 50-53 for various perspectives). Naturally, these environmental frameworks entail a substantial level of variation in terms of zoological and botanical niches. Also, recent research has suggested much more widespread vegetation in the Bronze Age than the barren plains of the present, especially in the Jazīrah, would seem to imply (see especially Deckers and Pessin 2010). While the geographical extent of the various ecozones discussed here may be speculative in places, the increasingly arid landscape of much of the region owes also to natural and man-made changes of later periods, particularly to the Iron Age (Wilkinson 2012, 16-17).

Landscape	Main features	Study sites	Rainfall
Montane woodlands	Upland forest with coniferous trees and species of oak. Good potential for pasture and procurement of produce, e.g. timber.	Alalah, Šušarrā	400-600 mm
Xeric woodland	Woodland characterised by oak, a variety of fruit and nut trees and shrubs. Reliable rainfall with good potential for farming and animal husbandry.	Ašnakkum, Qaṭṭarā, Šehnā	300-400 mm
Open woodland and steppe	Open steppe with dispersed growth of terebinth and almond. Rainfall with critical degrees of variation, mainly barley cultivation and pasture.	Ašnakkum, Qaṭṭarā, Šehnā, Tuttul	300-200 mm
Dry steppe and desert	Arid steppe and desert. Low potential for agriculture, but good pasture in winter and spring.	Qaṭṭarā, Tuttul	<200 mm
Riverine zones	River valleys characterised by gallery forests of tamarisk and poplar. Diverse wildlife, irrigation agriculture.	Tuttul, Alalah, Šušarrā	n/a

Table 2.2: Environmental zones and average annual precipitation levels relating to the individual study sites

2.4.1 Montane woodlands

The mountainous regions of the Bilād al-Šām, notably the Lebanon Mountains and the Coastal Mountain Range, and western slopes on either side of the Jordan, were formerly covered by dense woodland, namely eu-Mediterranean regimes in coastal regions characterised by deciduous oak, pine, terebinth, and olive. Montane forests at higher altitudes in the Lebanon and the Taurus ranges counted various firs, cedar, and juniper (Zohary 1973, 22-28, Moore *et al.* 2000, 51-52). The latter applies also to the Zagros, which, though enjoying a thermal regime quite similar to the Mediterranean, experiences continental, and often extreme, winter temperatures (Zohary 1973, 37 and 188-190). The montane woodlands were a primary source of timber, as acknowledged repeatedly in royal inscriptions from throughout the Bronze Age. In addition, these regions held a vast abundance of produce, e.g. fruit-bearing trees and shrubs. Wild species of apple (*Malus* sp.) and pear (*Pyrus* sp.) are extant in cooler parts of Turkey and the Bilād al-Šām. Various nuts form another group of edible fruits, in Anatolian environs deriving mainly from pine and deciduous trees such as walnut (*Juglans regia*). Though rarely encountered in archaeological investigations further south, cultivation of walnut in the Middle Bronze Age highlands above the Jordan has been documented recently (Langgut 2015). Closer to the Black Sea region one would also find hazel (*Coryllus avellana*). River valleys offered optimal possibilities for growing a range of fruits and cereals (see below), while higher slopes could be used for pasture.

Subalpine ranges of the Taurus and Zagros mountains are home to the bezoar, or wild goat (*Capra aegagrus*), progenitor of domesticated goats. Though they may descend into lowlands in the winter, they generally inhabit high mountain slopes and river valleys (Harrison 1968, 338-340). While the bezoar thrives at high altitudes and in rocky terrain, wild sheep (*Ovis orientalis*) inhabit mountain steppe, e.g. in the Iranian plateau, and descends to lower-lying pastures during the winter (Harrison 1968, 342-343). Wild pig (*Sus scrofa*) was reported in the mountains throughout the subalpine zone also in the 20th century CE (Hatt 1959, 57-58). Roe deer (*Capreolus capreolus*), now rare except for more inaccessible parts of the Zagros and Taurus mountain forests, was presumably more widespread in the past, and likely inhabited comparable environs closer to the Mediterranean also (Harrison 1968, 371-373). A number of larger carnivores inhabit montane forests and open woodland e.g. felids such as the lynx (*Lynx lynx*) in the Kurdish and Armenian mountains and, much more widespread, the leopard (*Panthera pardus*). Various subspecies of the latter appear with surprising regularity in upland hills and forests all over the Arabian Peninsula also in the 20th century, and feed especially on gazelle, sheep and goat (Harrison 1968, 307-309). Extant today only in isolated areas of the Caucasus, the Syrian brown bear (*Ursus arctos syriacus*) was probably more widespread in the past (see e.g. the discussion of the many bear figurines from 3rd millennium BCE Tall Brak` by Pittman 2002) and was formerly found also on Mount Hermon and in the Coastal Mountain Range (Harrison 1968, 222-224).

2.4.2 Xeric woodland

As one moves into the foothills and rolling plains on the Syrian plateau east of the Lebanon ranges and south of the Taurus, the denser montane forests give way to a transitional zone of xeric woodland comprising oak, terebinth, and fruit-bearing trees and shrubs in areas of high rainfall (400-600 mm). A dispersed regime would be found in transitional zones towards the 300 mm isohyet, characterised by more drought-resistant species of oak, almond, and shrubs with ground vegetation counting wild cereals and legumes (Moore *et al.* 2000, 52-60, Wilkinson 2003, 18-19). This zone offered optimal dry-farming conditions for a range of cereals, especially barley (*Hordeum vulgare*), but also species of wheat (*Triticum* sp.). The latter would mainly be cultivated in areas with higher degrees of moisture preservation. Lentil (*Lens culinaris*) and various types of pea and bean, notably the common pea (*Pisum sativum*), but also chickpea (*Cicer arietinum*) and broad bean (*Vicia faba*) are the main types of legumes represented in the archaeobotanical record. We also find fodder plants, mainly bitter vetch (*Vicia ervillia*), common vetch (*Vicia sativa*), and grass pea (*Lathryus sativus*). Wild species of a number of fruit-bearing trees and shrubs appear on the moister fringes of this zone and in adjacent upland environments. With sufficient precipitation or available surface water for the maintenance of orchards, the domesticated forms could be grown, especially olive (*Olea europea*), fig (*Ficus* sp.), grape (*Vitis vinifera*), and pomegranate (*Punica granatum*). Nuts could be obtained from deciduous trees, namely various species of oak (*Querqus* sp.) and especially terebinth (*Pistacia* sp.) and almond (*Amygdalus communis*). Persian fallow deer (*Dama mesopotamia*) roamed this zone in the Neolithic, inhabiting dense woodland in riparian and piedmont environments (Harrison 1968, 368, Moore *et al.* 2000, 87). Recent zooarchaeological analysis of Late Bronze Age strata at Alalah found fallow deer to be markedly present in the wild faunal assemblage (Çakirlar and Rossel 2010, also in the Bīqa, cf. Grigson *et al.* 2015, 167). Wild boar is another common sight in woodland and thickets and would also have been found in this zone, along with occasional groups of gazelles (see below).

2.4.3 Open woodland and steppe

In and beyond the marginal zone of sustainable dry-farming agriculture we find the open steppe, marked in areas with moister soils and reliable precipitation by scatters of drought-tolerant terebinth and almond, roughly within the 300-200 mm band of annual rainfall. This botanical configuration could have been found as far into the steppe as the ridges around the Tadmūr oasis, and in drier areas on hillsides with increased moisture preservation. In addition to plants associated with the drier steppe, this environment would also have supported extensive tracts of wild cereals (Moore *et al.* 2000, 60-63, Wilkinson 2003, 103-105). We have already touched upon the increased risk of crop failure in zones within the 300-200 mm isohyet band. While these areas could have supported agriculture to a limited extent, the high degree of variation in annual precipitation levels would have compromised long-term reliance on farming. Dryfarming in the drier steppe would have relied almost exclusively on barley and similar drought-tolerant crops, but the plains offered good pasturage for sheep and goat.

The steppe supported a varied fauna. Goitered gazelle (*Gazella subgutturosa*), formerly found in large numbers east of the Tigris and across the Jazīrah, is still to be seen around Tadmūr and in the Hauran today. Mountain gazelle (*Gazella gazella*), was common in hilly locales in the Jazīrah in antiquity (Moore *et al.* 2000, 85-86, also Mallon and Kingswood 2001, 88-106). Species of antelope formed one of the principal sources of meat for lions (*Panthera leo persica*), which are regularly attested in historical sources from the Bronze Age on, in the Khabūr basin (e.g. faunal remains from Early Bronze Age Tall Brak, see Mallowan 1947, 13) and in riparian environments along the Middle Euphrates. They were still extant in the Zagros and the Middle Euphrates towards the end of the 19th century CE (Blunt 1968 [1879]). The Syrian wild ass or onager (*Equus hemionus hemippus*) formerly inhabited the steppe on either side of the Euphrates in large numbers. Regularly observed by travellers of the 16th and 17th centuries CE, its numbers declined rapidly through the 19th century, and the species became extinct in the first half of the 20th century CE (Moore *et al.* 2000, 86). Layard recorded onagers in the 'Afār plain during his travels there in the 1840s (Layard 1849, 323). A contemporary account tells us of smaller numbers of onagers in the western Khabūr basin (Metaxas 1891, 325). Jackals (*Canis aureus* ssp.) inhabit plains and dry steppe and prey on a variety of small mammals, insects and animal carcasses. They are less common in upland and hilly environments (Hatt 1959, 37). Arabian wolves (*Canis lupus arabs*) roam further afield, and were formerly found everywhere from the Kurdish mountain valleys and into the Arabian desert, representing a perennial menace to livestock (Harrison 1968, 195-206).

2.4.4 Dry steppe and desert

Beyond the ridges east of the Tadmūrr oasis, and into the open steppe of the lower Jazīrah, annual precipitation levels of less than 200 mm enforced a dry and arid landscape broken by seasonal wādī troughs, with true desert environments reaching from around the lowermost part of the Jazīrah and into the Arabian

Peninsula. Large swathes of the dry steppe could have held substantial tracts of feather-grasses across a zone with annual precipitation levels of no more than a 100 mm, though modern examples indicate such vegetation regimes to be highly vulnerable to grazing (Moore *et al.* 2000, 63-69). Lack of contiguous soil cover, brought about by the absence of root growth able to provide a sustained structuring of the earth's surface, characterises the true desert, where vegetation is restricted to islands of increased moisture or improved soil composition (Moore *et al.* 2000, 69).

The arid steppe and desert of the southern Jazīrah and inner Arabian Peninsula formed the habitat of several larger mammals. Xenophon, who traversed the region ca. 400 BCE, attests to the abundance of gazelle, onager, and ostrich seen in the steppe along the Middle Euphrates valley downstream from the Khabūr junction (Xenophon 1972, 36). Goitered gazelle is today found mainly on the plains of the Jazīrah, Dorcas (*Gazella dorcas*) and Saudi gazelle (*Gazelle saudiya*) are more firmly associated with the drier steppe and desert south of the Euphrates. The latter habitat was also home to the Arabian oryx (*Oryx leucoryx*), still found in western Iraq as late as the 19th century CE (Moore *et al.* 2000, 89, Mallon and Kingswood 2001, 88-106). The Arabian ostrich (*Struthio camelus syriacus*) appears in written sources from the Bronze Age on, both in domestic and wild contexts, and roamed the drier steppe and desert of the Jazīrah and the Bilād al-Šām. Highly prized for its feathers, eggs, and important symbolic status through most stages of Middle Eastern history (a tribute of ostrich eggs was brought to Faiṣal during the Arab Revolt, cf. Lawrence [1935] 2008, 179-180) it only became extinct around the middle of the 20th century CE. Cheetahs (*Acinonyx jubatus*), of a subspecies now extinct in the Arabian Peninsula, inhabited the dry steppe and desert until the recent past, feeding mainly on gazelles and smaller mammals. Modern accounts constrain their habitat to the desert south and west of the Euphrates, but they have also been encountered in more hilly environments around the Dead Sea (Harrison 1968, 310-313).

2.4.5 Riverine zones

Riverine areas provide for localised ecological habitats with higher and more varied degrees of vegetation, especially in the Euphrates and, to a somewhat lesser extent, in the Tigris river valleys. Similarly distinctive local configurations can be found in marshes, especially in the Amuq and al-Ghāb in the lower Orontes drainage, but would also have been found in areas now characterised by a more severe aridity due to decreasing water flow, e.g. the marshes in the eastern Khabūr Basin (Wilkinson 2013, 130-131). Vegetation in this zone was characterised by reed and gallery forests, principally constituted by tamarisk (*Tamarix* ssp.) and poplar (*Populus euphratica*) in the valleys of the Middle Euphrates and its tributaries. Riverine canopies provided optimal environments for the growing of wine, attested in its wild form (*Vitis vinifera sylvestris*) in the Upper Euphrates valley. Orchards comprising a range of fruit-bearing trees and shrubs already mentioned, mainly fig, grape, and pomegranate, would have been common in river valleys, while access to a regular supply of water naturally offered optimal conditions for the growing of cereals.

Riparian zones, especially in the Middle Euphrates valley, were able to support a wide range of fowl, mammals, and reptiles. The (still) abundant numbers of duck, goose and smaller waterfowl, along with various species of pheasant and francolin, were noticed by late 19th century CE European travellers (Blunt 1968 [1879], 84 and 169-170). Larger wild mammals, notably lion and wild boar, have since disappeared. Riparian environments would also have formed the principal habitat for the extinct Syrian elephant (*Elephas maximus asurus*), a subspecies of the Asian elephant, which has been proposed still extant in the Bilād al-Šām and the Jazīrah in the Bronze and early Iron Age, and was hunted in the Middle Euphrates valley by Neo-Assyrian kings (Becker 2005, 2008, Caubet and Poplin 2010, also Lister *et al.* 2013). Freshwater fish abounded in the Tigris-Euphrates drainage, mainly species of carp (*Cyprinidae* sp.) and catfish (*Sisoridae* sp.) (e.g. Krupp and Schneider 2008, also Coad 2010). Fish appear also as a popular source of food in Bronze Age textual sources from the Jazīrah (discussed in more detail later). Though often overlooked in the archaeological record, this easily replenishable source of oil and proteins was no doubt widely utilized also in the past (Potts 2012, for a rare level of detail in the retrieval of fish remains from archaeological excavations in the region, see Jacques *et al.* 2003).

3 Historical outlines

To add a social aspect to this environmental outline, let us consider the historical position of the study sites within the Middle Bronze Age, roughly within the centuries spanning the period from c. 2000-1600 BCE (Figure 3.3). As noted earlier, the living history of the political economies that are the focus of this study all fall within a narrow window spanning the 18th and 17th centuries BCE, thus providing us with a sample of cases with a high degree of temporal proximity. With regards to social history, another common trait should be noted; none of the six study sites were capital cities of the larger kingdoms that emerged in the wake of the Early Bronze Age imperial formations, e.g. the realms of Šamšī-Adad and his sons, of Zimri-Lim of Mari, or of the lines of kings that ruled from Aleppo, Qatna, or Babylon (Šehnā was, but the documentation that we are concerned with here relates to later periods). They formed important local nodes of power in their own right, however. Tuttul was acknowledged as a political player within the Ebla horizon of the mid-3rd millennium BCE, as was Šehnā (Sallaberger 2007). In the political correspondence of the mid-18th century BCE, lords of Ašnakkum often invoked lineages that stretched back for decades and decades (Rattenborg in press), and architectural sequences mimic palatial institutions of a similar longevity, at Alalah and at Šušarrā. While rarely taking centre stage in general accounts of the period, the historical overview given here should demonstrate their local prominence and relevance within the wider social landscape.

3.1 Preludes: the early Middle Bronze Age (c. 2000-1800 BCE)

The beginnings of the Middle Bronze Age followed upon the demise of the Third Dynasty of Ur (ca. 2100-2000 BCE). Its downfall is often related to incursions from regions to the east and the west, but internal political fragmentation probably formed another driving factor (Postgate 1994, 41-43, van de Mieroop 2007, 82-84). The magnitude of events resonates in later literary accounts, and is perhaps reflective of demographic developments that were equally applicable to the first centuries of the Middle Bronze Age. In the upland plains especially, indications of an influx of new ethnic groups are substantial, and in the 18th and 17th centuries BCE merely the finalisation of movements initiated towards the end of the 3rd millennium BCE (Liverani 2013, 173-181, consider also Fleming 2004, 8-13).

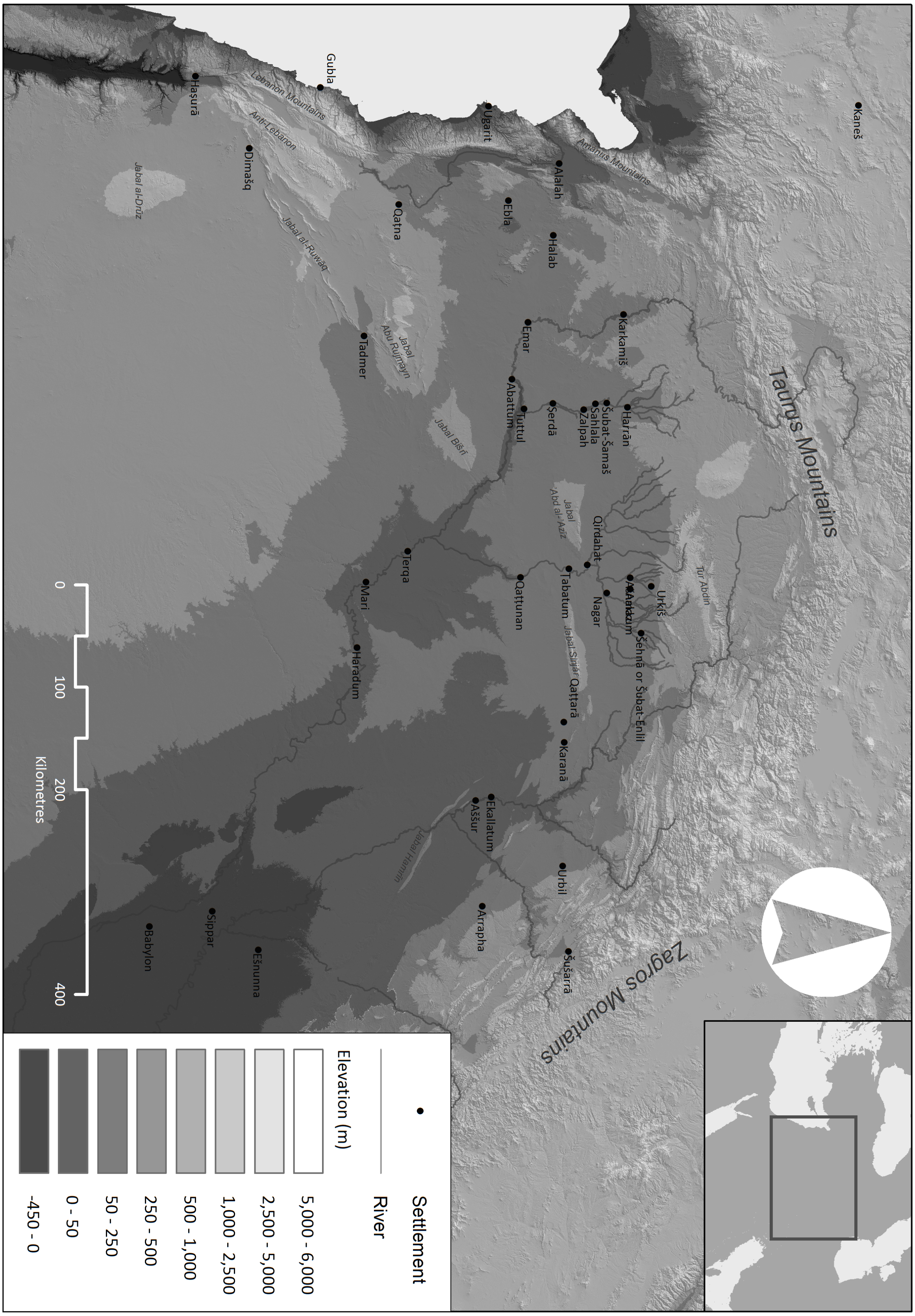


Figure 3.3: The Middle East in the Middle Bronze Age, with principal river courses and settlements mentioned in the text

The degree to which these upheavals impacted on the settlement record has been much and thoroughly debated. Repeated arguments for the driving force of major climatic changes towards the end of the Early Bronze Age (e.g. Courty and Weiss 1997, Staubwasser and Weiss 2006) remain inconclusive as it is hard to locate a common temporal fault-line in archaeological strata and historical accounts (Ur 2010a, 412-413, McMahon 2013, 471, consider also Schmidt 2015, 388-390). Others have proposed to see the end of the Early Bronze Age as the initiation of a more lasting development towards increased settlement dispersion and population decline terminating only at the beginning of the Iron Age (ca. 1100 BCE) (Wilkinson 2003, 126-127).

3.1.1 The Jazīrah during Kültepe Level II (c. 1950-1850 BCE)

If the reasons for the break-up of the dense 3rd millennium BCE settlements remain only partially understood, the current state of research allows us to delve in some detail on the landscape that followed. In the Jazīrah, the earliest century of the 2nd millennium BCE is, with some exceptions, characterised by a remarkable drop in the overall intensity of settlement (Wilkinson *et al.* 2014, 93). While resurging from 1900 BCE onwards, settlements on the whole remained smaller than in the past, and seem to display a marked degree of mobility and dispersal. The rise of a flowering trading community at Aššur provides a first textual light on the early Middle Bronze Age, manifested by the merchant archives found at Kaniš (modern Kültepe) on the Central Anatolian plateau (for a recent overview of Old Assyrian sources, see Veenhof 2008, 35-61, for a general synthesis, see now Larsen 2015). Early evidence suggests that trading between Aššur and Kaniš could have begun by the first half of the 20th century BCE, thus providing an almost seamless transition between commercial infrastructures of the Third Dynasty of Ur and later periods (Veenhof 2008, 32, but see critical comments in Barjamovic *et al.* 2012, 59, for Early Bronze Age trading networks in the Jazīrah, the Bilād al-Šām, and Anatolia, consider Bachhuber 2013). Documentation pertaining to the main period of Assyrian trading activity at Kaniš (Kültepe Level II, ca. 1950-1850 BCE) can however, be confined to a relatively short timespan according to surveys of the textual assemblage. A recent study pointed out that the bulk of Assyrian commercial activity at the site is confined to a couple of decades at the beginning of the 19th century BCE (Barjamovic *et al.* 2012, 55-73). Within this fairly short timespan, several cities prominent in political correspondence more than a century later already figure as important stopping points on the caravan road to Anatolia. Qaṭṭarā appears in several itineraries (Forlanini 2006, 150-160), as does Apum, a city which, though not located, was very closely related to Šehnā. A merchant trading station (Akk. *kāru*) is attested at the latter site in the 18th century BCE (Eidem 2008b). Further west, in the central Khabūr Basin, the identification of Tall ʻArbīd with 19th century BCE Amaz (Eidem 2008b, 40) has recently been further substantiated through a reinterpretation of the regional ceramic horizon (Koliński 2014a, 30-31).

3.1.2 The Middle Euphrates: the *šakkanakku* of Mari (c. 2000-1850 BCE)

On the Middle Euphrates, information on the beginnings of the Middle Bronze Age is equally scant. From the end of the Early Bronze Age and until ca. 1900 BCE, the history of this area and regions further west is practically uncharted (Charpin 2004, 133). At Mari, local power structures formed under the aegis of Early Bronze Age imperial formations on the alluvial plain remained in place. Scribal traditions relating to the *šakkanakku*, a ruler's epithet betraying the city's former status as a governorate were maintained until the appearance of an Amorite dynastic line around the mid-19th century BCE (Durand 1985). Recently found texts dating to this period will no doubt shed further light on Mari and its environs at the beginning of the 2nd millennium BCE (Cavigneaux and d'Istria 2009, also d'Istria 2014, 169-171). The resilience of settlement, of scribal traditions, and of monumental architecture at Mari during the period from 2000-1800 BCE certainly provides an intriguing bridge between the Early and Middle Bronze Ages (Fleming 2004, 7-8, Margueron 2013b, 530-532).

Polities of a similar historical durability are also in evidence at Tuttul, which maintained administrative traditions and monumental complexes comparable with those of the *šakkanakku* at Mari (Krebernik 2001, 7, Akkermans and Schwartz 2003, 287). Middle Bronze Age settlements within the Balīkh valley, from Tuttul and upstream to the plain around Harran maintained a distributional pattern similar to that of the Early Bronze Age, with a high percentage of very small, hamlet-size sites associated with a few, larger settlements (Wilkinson 1998, 71-73, Hritz 2013b, 146-148). Comparable assessments have been made for the Euphrates Bend downstream from Karkamiš (Matney 2012, 565-566, Cooper 2013, 488). Patchy as the textual record may be, it suggests that several urban centres in the Jazīrah plains and, more decisively, on the Middle Euphrates, remained important infrastructural nodes across the first centuries of the Middle Bronze Age. Conversely, the prominence of many of the same settlements during the period covered by the Mari archives (ca. 1850-1763 BCE), at a time where the Old Assyrian trade had dwindled relative to its former glory should warn us against viewing any singular body of evidence in isolation (on the scale of trade during Kültepe Level Ib, see Barjamovic *et al.* 2012, 73-74). Turning to regions further beyond can further qualify these impressions.

3.1.3 Beyond the Euphrates: the Bilād al-Šām in the early Middle Bronze Age

The history of the Bronze Age Bilād al-Šām parallels trajectories seen further east. The more diverse and more compacted array of ecological configurations found here does, however, provide for a more kaleidoscopic social landscape, in which multiple lines of subsistence are employed in tandem and may serve to counter periods of social and environmental stress (Genz 2012, 607-608). The end of the Early Bronze Age offers little in the way of a unison decline in settlement compared to developments seen in the Jazīrah (Cooper 2013, 488). Settlements in the Amuq around Alalah, for example, display no discernible decline across the last centuries of the 3rd and the first centuries of the 2nd millennium BCE (Casana and Wilkinson 2005b, 45). Ebla, famed for its monumental Early Bronze Age complexes, remained an important urban centre until well into the Middle Bronze Age (Akkermans and Schwartz 2003, 294). Qatna, conversely, grew from its respectable 30 ha Early Bronze Age main mound to a 100 ha walled city by the Middle Bronze Age (Bryce 2009, 578-580). Further south, in the Beqa'a and along the the Jordan Valley, the latter half of the Early Bronze Age, from ca. 2500 BCE onwards, witnessed a general turn in settlement trends towards smaller, dispersed sites sustained by agro-pastoralist subsistence economies. These developments substantially contrasts survey results from further north, where settlement contraction and abandonment only came about some centuries later, and are likely a consequence of the only limited potential for further settlement expansion offered by marginal zones to the east (Wilkinson *et al.* 2014, 90-92). The lack of textual evidence inhibits particular elaboration on political organisation, but it may be noted that Yahdun-Lim, Šamšī-Adad, and Zimri-Lim all honed political relationships centred on Yamhad, modern Aleppo, and Qatna, both capital cities in the 18th century BCE and, probably, also earlier in the Middle Bronze Age. These elite networks echo the equally close, and sometimes violent, political relationships observed between Early Bronze Age cities such as Ebla, Mari, Tuttul, and Nagar (Tall Brak) (Sallaberger 2007, 450).

3.1.4 East of the Tigris: the Assyrian plains and the Zagros foothills

The lands east of the Tigris are only moderately surveyed and our knowledge of this region at the turn of the 3rd millennium BCE derived, until very recently, primarily from a sparse collection of textual sources (for a recent historical survey, see Ahmed 2012). Surveys are currently under way in upland basins, i.e. the plains of Rānīah (Eidem 2015) and the Šahrizūr (Altaweel *et al.* 2012) and in the plains around Erbil and Kirkuk (for a recent general overview of archaeological research in northern Iraq, see Kopanias *et al.* 2015). Collation of research on the lowland plains east of the Tigris points to a noticeable drop in settlement from the Early to the Middle Bronze Age, though a focus on mounded sites may distort this picture (Mühl 2012, 86-90). Evidence of similar trends in upland areas are lacking, e.g. in preliminary results from the Šahrizūr (Altaweel *et al.* 2012, 25-26 and Fig. 26), and in the, admittedly dated, survey by al-Soof of the Rānīah Plain (al-Soof 1970). Lowland areas on both sides of the Greater Zab demonstrate similarly contradictory patterns. In the eastern Navkur Plain, the number and aggregate area of settlements increased markedly from the late 3rd millennium BCE to the Middle Bronze Age (Koliński 2014b, 10-12), and also on the opposite side of the river (Ur *et al.* 2013, 110-112). To summarise, the general region, from the Mediterranean to the Zagros, certainly saw substantial changes both in terms of settlement density and structure, and in terms of demographic characteristics, towards the end of the 3rd millennium BCE. It is, however, hard to synthesise currently available data with reference to an overarching narrative of abandonment, depopulation, and overall decline. East and west of the rolling plains of the Jazīrah, settlement continuity seems to indicate social stability rather than fragmentation, while major settlements in the Middle Euphrates, such as Mari and Tuttul, maintained durable political institutions through textually uncharted centuries.

3.2 The long century: the Middle Bronze Age II (c. 1800-1700 BCE)

The latter half of the 19th century BCE saw the rise of new political dynasties across the Jazīrah and in the alluvial plain. In the latter region, the warring centuries since the end of the 3rd millennium BCE concluded with the fall of Isin to Rim-Sin I of Larsa in 1793 BCE, and the following year saw Hammurabi rise to the throne of Babylon (van de Mieroop 2007, 90-92). At Mari, the rule of Yaggid-Lim and his son Yahdun-

Lim (r. ca. 1810-ca. 1794 BCE) inaugurated a polity that quickly expanded to include much of the Middle Euphrates (Charpin and Ziegler 2003, 32-49). Tuttul, earlier overseen by a local king, was subdued by Yahdun-Lim late in the 19th century BCE (cf. survey of the textual sources in Krebernik 2001, 4-10). In the Khabūr Basin, the political influence of Mari appears closely linked to the economic importance of the plains as livestock pasturage for pastoralists, implying that the economic exploitation of these habitats involved communities across the Jazīrah and the Middle Euphrates regions (Charpin 1990b, 68-71).

Common to most of the dynastic lines appearing at this time, including that of Šamšī-Adad, to be discussed shortly, was their often explicit association with an Amorite social identity (Akkermans and Schwartz 2003, 288-291, Liverani 2013, 229). Kings from Yamhad (Aleppo) in the west to Elam in the east all invoked comparable ideological and symbolic paraphernalia in their engagement with regional political networks. The extent to which a real or postulated Amorite ethnicity lastingly altered the social landscape is ambiguous (van de Mieroop 2007, 89-90, for a perspective from the alluvium, see concluding points in de Boer 2014, 277-282). Elusive as it may be, the term has also received scholarly attention in part due to the string of very able rulers who came to define much of the historical period under consideration here.

3.2.1 The Kingdom of Upper Mesopotamia (c. 1810-1775 BCE)

The first quarter of the 18th century BCE is, in the Jazīrah at least, guided mainly by the rise and fall of the polity led by Šamšī-Adad. In less than half a century, his kingdom, commonly referred to as the Kingdom of Upper Mesopotamia, came to control vast swathes of the upper Tigris-Euphrates drainage. At its height, this polity controlled territories from the Zagros foothills in the east to the banks of the Euphrates around Karkamiš in the west, including historically important cities such as Mari, Aššur, and Šehnā (for a historical summary, see Charpin 2004, 147-191). Our knowledge of the early life of Šamšī-Adad is confined to a poorly understood context centred on the lower course of the Diyala and the Baghdad plain (Charpin 2004, 149-150, cf. Durand and Guichard 1997, 28, also Wu 1994, 62-53). In the eponymal year of Dadaya (1808 BCE), Šamšī-Adad took Aššur, having conquered nearby Ekallatum a few years earlier. Within the following decade, the armies of Šamšī-Adad moved west into the Khabūr Basin where he clashed with allies of

Yahdun-Lim. It was most likely during these campaigns that he founded his royal capital at Šehnā, which he renamed Šubat-Enlil (Charpin 2004, 151-152).

Following the conquest of Mari and the fall of the Lim dynasty in 1794 BCE, the Kingdom of Upper Mesopotamia soon came to obtain the political structure that it was to maintain until its ultimate demise some twenty years later. Šamšī-Adad installed himself at Šubat-Enlil, and entrusted substantial parts of the realm to his sons, respectively Išme-Dagan in Ekallatum on the Tigris and Yasmah-Addu in Mari on the Euphrates. In the west, the last decade of Šamšī-Adad's reign saw a lasting state of enmity with Sumu-epuh of Yamhad, a situation that likely had some bearing on the marriage of Yasmah-Addu to a princess of Qaṭna (Charpin 2004, 169). In the east, years of fighting with the king of Ešnunna in the Diyala region was turned into a joint campaign against kinglets on the Assyrian plains, an alliance that eventually saw Šamšī-Adad's power extended to the gates of the Zagros. At Šušarrā on the Lower Zab River, the local lord turned on his former masters in the Iranian highland and sided with Šamšī-Adad, an arrangement that, although short-lived, is amply documented in textual finds from the site (Eidem and Læssøe 2001).

While impressive when outlined on a map, the polity fostered by Šamšī-Adad and his sons remains somewhat at odds with traditional concepts of state formation. Though traditional narratives refer to the 'kingdom' or 'empire' of Šamšī-Adad or Upper Mesopotamia with seemingly little need for critical qualification, the political organisation implied by such terms was hardly politically stable, nor spatially contiguous (Eidem 2014, 138, Rattenborg in press). The king and his sons consciously emulated the local power structures that they had subdued. In taking over Mari, for example, the political territory that was eventually given for Yasmah-Addu to rule bears a striking resemblance with the geopolitical environs controlled by his predecessor, Yahdun-Lim (Villard 2001, 17-18). This may explain the sudden and rapid demise of Šamšī-Adad's kingdom following his death late in the year of Ṭāb-ṣilli-Aššur (1776 BCE). The ease with which local rulers attained control of individual cities in the Jazīrah, particularly in the Khabūr and the Balīkh drainage in subsequent years may indicate a low degree of centralised political control imposed upon local communities during Šamšī-Adad's reign (Meijer 2000, 234-236, Eidem 2000, 261-262). In a wider perspective, these events can be seen as a testimony to the resilience of localised political infrastructures (consider also the insightful discussion by Barjamovic 2013).

3.2.2 Resurgent tribal lineages: the reign of Zimri-Lim (c. 1775-1763 BCE)

The rapid disintegration of Šamšī-Adad's empire witnessed the resurgence of past political networks on a more general level. Zimri-Lim, a younger relative of the 19th century BCE ruling dynasty took over the city of Mari, and quickly consolidated his power over that stretch of the Middle Euphrates Valley that had formerly been controlled by Yahdun-Lim and, during the imperial interregnum, by Yasmah-Addu, son of Šamšī-Adad. In the Khabūr Basin, the former capital of Šubat-Enlil, or Šehnā, remained a seat of power for half a century, ruled by a series of local lords. The political correspondence unearthed at the site regularly echoes political relationships also seen in a more distant past, e.g. the 'land of Apum' that the kings of Šehnā considered their territory (Eidem 2011a, 1-59). Further west, at Ašnakkum, the textual documentation terminates rather curiously in 1776 BCE, the year before the death of Šamšī-Adad. Archaeological investigations, however, have detected no discernible break in settlement, implying that to the extent that political changes substantially affected this town, they did so relatively peacefully (McMahon 2009, 25).

The decade in which Zimri-Lim ruled Mari is documented in the extreme, courtesy of the huge cache of letters and administrative documents found in the ruins of the Middle Bronze Age capital city (for an introduction to the textual corpus, see Charpin and Ziegler 2003, 1-2, for a historical overview, see Heimpel 2003a, 37-162). The reign of the last king of Mari is characterised both by the continuance of the realm that had emerged as a key agent within the wider region already in the 3rd millennium BCE and the integration of powerful tribal networks into the political fabric of the kingdom (Fleming 2004). Further north, in the Jazīrah, local lords jockeyed for power in a complex and ever changing web of alliances and small-scale hostilities (Guichard 2014, Eidem 2000). The political volatility of the northern plains was further compounded by the more far-reaching influences of Yamhad and Babylon, observable with particular clarity after the demise of Zimri-Lim in 1763 BCE. Letters and administrative texts from Šehnā testify to the regular contact with emissaries from Yamhad around the middle of the century (Eidem 2008a, 290-293). South of the anticlines, in the 'Afār Plain, letters from Qaṭṭarā demonstrate the political reach of the ageing Hammurabi of Babylon (Eidem 1989), and later his son, Samsu-iluna (Lacambre and Nahm 2015).

Our knowledge of the historical landscape of the Bilād al-Šām during the 18th century BCE draws on letters from Mari and elsewhere in the Jazīrah, rather than from localised sources. Archaeological finds from other sites in the region testify to the continued prosperity of several urban centres. The architectural remains of Middle Bronze Age Ebla are as imposing as those of the mid-3rd millennium BCE, while Qaṭna and Alalah both display palatial complexes with a long history of occupation. Further south, Hazor constituted a centre of comparable magnitude (Akkermans and Schwartz 2003, 297-306). Despite the, sometimes, dim surveys of grinding conflict and burning cities, other proxies offer some noteworthy indications of social continuity. Reappraisals of the Old Assyrian textual documentation point to the continued activities of merchant families from Aššur across the Central Anatolian Plateau also during Kültepe Level Ib, e.g. at Kültepe, Boghazköy, and Alişar (for the former, see Barjamovic *et al.* 2012, 73-80, on Assyrian presence at the latter two, see Dercksen 2001). The more refined chronological framework now applicable to Old Assyrian sources allows us to pinpoint this period with more confidence, i.e. as a quite even distribution of texts across the period from ca. 1825-1725 BCE (Barjamovic *et al.* 2012, 73-74). The later phase of Assyrian commercial activity in Anatolia was then, on present evidence, not sponsored by the polity led by Šamšī-Adad, but dependent on other, potentially more mundane and localised dynamics (see the thoughtful considerations given in Veenhof 2008, 30-32).

3.2.3 Pastoral and sedentary networks

An increasingly important pastoralist element can be traced in archaeological as well as textual datasets related to the Middle Bronze Age across the general region, and should be discussed here (for a recent concise discussion of and conceptual distinction between nomadism and pastoralism in the Bronze Age, see Meijer 2014, 164-167). The role of herding and livestock rearing within the general region has a long history. For the Early Bronze Age, Zeder has proposed a growing reliance on specialised animal husbandry in the steppe beyond the environs of the major tells, based on the increasing number of sheep and goat remains in faunal samples (Zeder 2003, 162-164). The importance of sheep and goat is further underscored by the huge cuneiform archives unearthed from Palace G at mid-3rd millennium BCE Ebla, where institutional management of flocks running into the hundreds of thousands of sheep is common (see recently Biga 2014, 141).

In the Middle Bronze Age Jazīrah, several archaeological surveys observe a rise in small, single-period sites, often with insignificant stratigraphic profiles, suggestive of semi-sedentary occupation and subsistence strategies reliant on pastoralism (e.g. in the Balīkh Curvers 1991, 201-207, but consider also Hritz 2013b, 146-155, in the eastern Khabūr Plain Ristvet 2005, 120-123). The general paucity of permanent settlements in the western Khabūr during the Middle Bronze Age has been linked to predominantly pastoralist economic practices (Wilkinson 2002). At the time of the Mari archives, pastoralism becomes intimately linked with tribal structures and is, in turn, taken as indicative of a social divide between communities reliant on herding and agriculture respectively (Fleming 2004, 34-39). While tribal networks may play a significant role in the political landscape illuminated by the vast epistolary source material, we should be careful not to overemphasise social antagonisms. Pastoralist and sedentary economies in the Bronze Age most likely constituted an intimate and symbiotic relationship, as recently argued by Meijer (2014). Letters relating to the interaction between transhumant shepherds and farming communities in the Khabūr Basin indicate a social world characterised by close-knit economic and cultural interrelations (Guichard 2014, 153).

3.3 Transitions: the late Middle Bronze Age (c. 1700-1600 BCE)

The last century of the Middle Bronze Age is often presented as a period of regional decline leading down to the sack of Babylon in 1595 BCE at the hands of Hittite raiders (Akkermans and Schwartz 2003, 326, Liverani 2013, 253). Research of recent decades has done much to revise this rather bleak narrative, however, and we should also recall the potentially more long-term development that may account for the increasingly dispersed nature of settlement across the general region (Wilkinson 2003, 126-127, also Wilkinson *et al.* 2004). Still, a great many of the cities that made up the close-knit political landscape of the 18th century BCE began withering away towards the end of the Middle Bronze Age. The epistolary and administrative texts of the kings of Apum span the third quarter of the 18th century BCE until some years before the taking of Šehnā by Samsu-iluna of Babylon in 1728 BCE (Eidem 2011a, 1-5). The contemporary assemblage from the Qaṭṭarā temple administration terminates at the same time, though archaeological finds attest to continued activity both at the local sanctuary and the settlement more generally (Lacambre and Nahm 2015). Further textual finds, e.g. from the merchant town of Haradum (ca. 1725-1625 BCE) on the lowermost reaches of the Middle Euphrates

Valley, certainly testify to continued trading activity up and down the river also in later times (Joannès *et al.* 2006).

3.3.1 The Hana kings and the Middle Euphrates Valley after 1750 BCE

Past political territories remained, albeit in new guises. In the Middle Euphrates Valley, the political vacuum generated by the sack of Mari in 1763 BCE was later exploited by ruling elites located at Terqa (modern Tall Ašara), some 50 kilometres upstream the Euphrates at the Khabūr confluence. Already a prospering governor's seat during the reign of Zimri-Lim, the city continued to thrive in the latter half of the 18th and throughout the 17th century BCE under a string of kings contemporary with the successors of Samsu-iluna of Babylon. These were lords of a polity called Hana, a term also appearing in 18th century BCE sources from Mari (for a historical overview, see Podany 2002). Even if the chronological framework for the history of this city remains only partly understood, textual finds from Terqa bear testimony to a fairly consistent historical continuum across several centuries (ca. 1700-1300 BCE), encompassing the end of the Middle Bronze Age and the Late Bronze Age periods of Mitannian and Middle Assyrian imperial aspirations (for recent discussions of the chronological framework, see especially Yamada 2011, 76-77, also Podany 2014). The position of the kings of Terqa during the 17th century BCE appears to be one closely associated with the later kings of Babylon, while scribal styles familiar to the Hana textual corpus appear also at Ṭabān further north, at the entrance to the Khabūr Basin.

3.3.2 Alalah, Qaṭna, and Yamhad: the Bilād al-Šām in the 17th century BCE

Westward, in the Bilād al-Šām, the 17th century BCE is marked by the rich documentation from Alalah close to the Mediterranean Sea. A recent reappraisal of the chronology of the Middle Bronze Age tablets found there confirms with some qualifications the general historical outline that places the beginning of Alalah Level VII in the latter half of the 18th century BCE, and the sacking of the palace precinct around a century later (Lauinger 2015, 227). Further south, at Qaṭna, material culture associated with the foundation of the royal palace bears clear stylistic similarities to sculptures unearthed at Alalah Level VII (Novak 2004, 311, Morandi Bonacossi 2007, 236-237). The archive of Idadda, retrieved from the destruction layers of the royal palace and dating to the 14th century BCE, sheds a rare historical light on the period just prior to the termination of this structure several centuries later (Richter and Lange 2012, 1-3 for a brief historical contextualisation).

Methodology

Integrating textual and archaeological datasets, this thesis focuses on the investigation of *social networks in archaeological landscapes.* ‘Archaeological landscapes’ may be preliminarily defined as the tangible remains of past social and cultural environments traceable through the archaeological record (Wilkinson 2003, 3-4). The latter, broadly defined, encompasses data derived from excavation, survey, remote sensing, and textual sources. Though this oversimplifies the concept of landscape (see e.g. Ashmore and Knapp 1999, Anschuetz *et al.* 2001, Ashmore 2004, Johnson 2007, 1-4), it also maintains a division between evidence of past social practice and our interpretation of it. ‘Social network’ refers to a concept derived from sociology (Mann [1986] 2012), describing the relations of social entities and of particular social practices through time and space. Social networks here represent a way of conceptualizing economic, political, and ideological practices and structures, in order to discuss and understand their development in both a temporal and a spatial dimension. The interpretive framework employed in the current study focuses on the comparison and evaluation of the material scale of organisation, parent site, and micro-region. I use a model approach to social networks and infrastructures as a conceptual means to trace organisational patterns emerging from the administrative cuneiform record of institutional households, and notions of an archaeological landscape to discuss the relation of this unit to its parent site and the assembly of settlements within its local hinterland, a micro-region. The following sections describe the framework and methods of this approach, and further introduce specific archaeological datasets employed in the analysis (Figure 4.4). I reserve an introduction of the data structure employed in the retrieval of information from administrative cuneiform texts to Chapter 5.

4 Reconstructing landscapes

I should stipulate that my concern in the study as a whole and in this section in particular, is to define a formal way in which to approach the economic scale of the institutional household organisation at a regional and comparative level. The analytical framework laid out here is meant to facilitate comparison across multiple examples from the general study region, but not to convey a functionalist reconstruction of a city, or a state, and its hinterland.

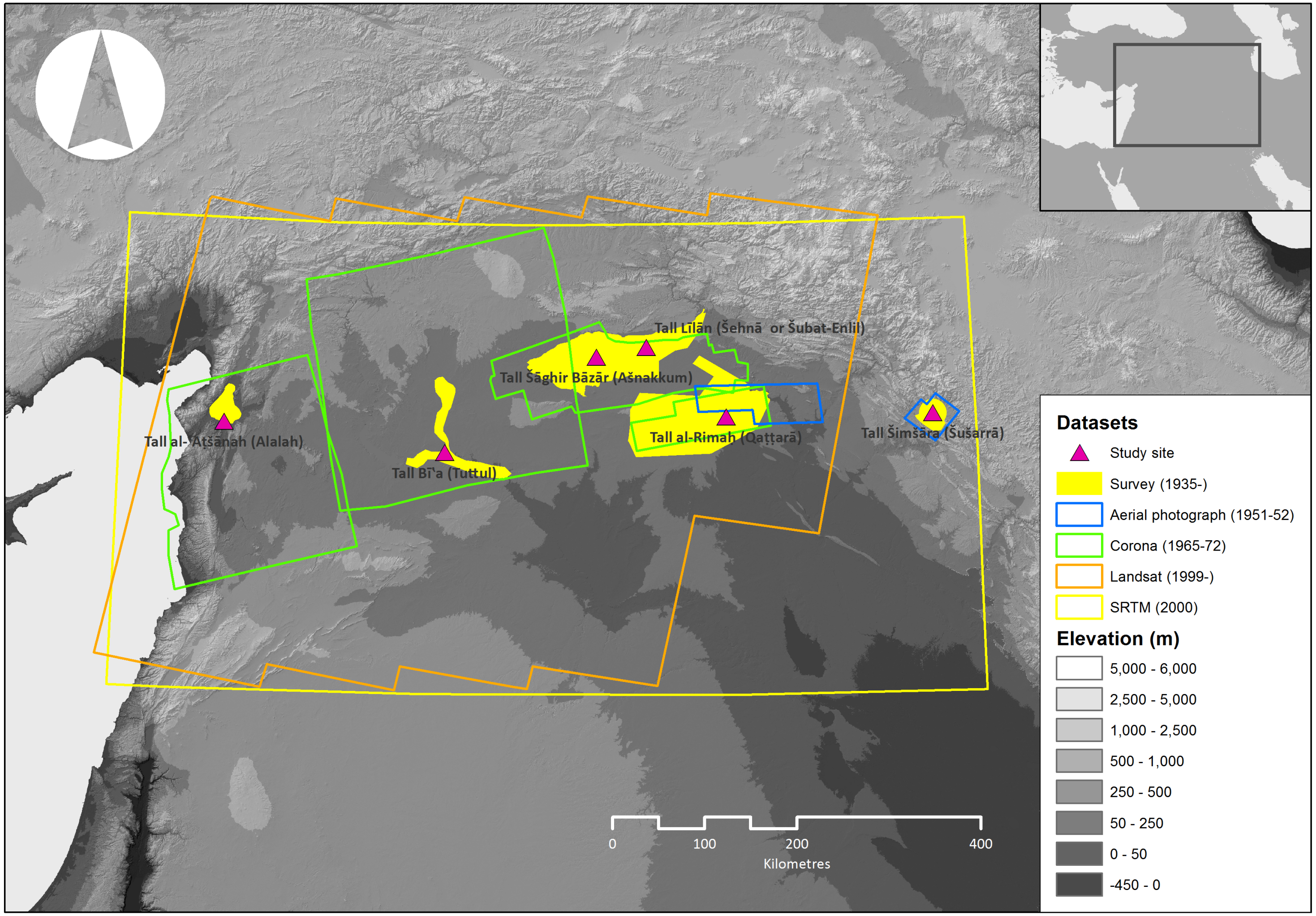


Figure 4.4: Overview of study area with study sites and relevant survey and imagery datasets

I use the tripartite framework of organisation, site, and micro-region as a basis for discussing magnitudes of economic scale at different levels of analytical resolution. Accordingly, my methodological perspective incorporates elements founded on three spatial levels of analysis (adopted, with modifications, from Trigger 1967, 151-152). The first is the provenance and social context of textual evidence and the spatial contextualisation of associated bodies of historical information with reference to tangible economic organisations. At this level I aim to situate primary textual assemblages within their discrete social context, and, by inference, to delineate and understand the role of the political economies that produced these assemblages. The second focuses on the parent site, and lays out the relevant variables for evaluating the subsistence needs of a settlement and the possible ways in which this can be compared to a distinct economic organisation. The third expands upon elements employed in the analysis of individual settlements to develop an associated micro-region derived from archaeological survey datasets. This requires us to define the extent and configuration of settlement hierarchies associated with the study site and the textual documentation pertaining to economic organisations (consider here e.g. Earle and Kolb 2010). Our analytical perspective is thereby extended, so as to relate the settlement and its resident social organisations to the wider material and social hinterland.

4.1 Tracing social organisations

The core empirical basis of the present study is a database of quantitative information derived from more than 1,500 administrative cuneiform texts from the six study sites. The structure and content of this database is discussed in detail in 5.2. Here, I outline how the derived data is approached in analyses, and specifically the theoretical and conceptual framework utilised in its interpretation. My perspective on social action in history is guided by the writings of British sociologist Michael Mann (b. 1942) and his theory of social power as a general means of historical analysis. A comprehensive discussion of this model is well beyond the ability of the present study (see especially Mann [1986] 2012, 1-33, [1993] 2012, vii-xvii and 1-10, for important critical discussions see contributions in Hall and Schroeder 2006, here especially Collins 2006, Goldstone 2006, Schroeder 2006). Despite regular references in general overviews of social theory in archaeological literature (and here especially with regards to political agency, see e.g. Stein 1998, 5-6, Yoffee 2004, 34-38, Routledge 2014, 16) the analytical apparatus of Mann appears but rarely as an integrated element in archaeological research agendas (for a rare adaptation, see Chapman *et al.* 1996, 9-15, also Chapman and Laszlovszky 2010, 1-7). Here I concern myself only with those elements that are of direct relevance to our analysis, as well as aspects of the general theory necessary for their proper understanding.

4.1.1 Societal ontologies

The key premise of Mann's sociology is that there is no such thing as 'society'. This produces some approaches to 'society' and 'social' that are fundamentally different from evolutionary and functionalist perspectives (for the latter, consider the critique by Smith 2003, 33-54). The social power networks of Mann can only be fully appreciated if proceeding from a rejection of society as an ontologically valid concept of analysis (Mann [1986] 2012, 1-2, Collins 2006, 24, Goldstone 2006, 263-264). Throughout his work, Mann focuses on the individual nodes and networks of social action, a premise also found in the later works of Bruno Latour (Latour 2005, 5, consider e.g. Mann [1986] 2012, 14). It follows here that society, rather than being a preordained ontological yardstick, is built from the interpretive analysis of social networks, networks that "overlap, intersect, entwine, and sometimes fuse, in ways that defy simple or unitary explanations" (Mann [1993] 2012, viii).

4.1.2 Aspects and types of social power forms

How does Mann reconstruct the social? His theory builds on the recognition of four types of power sources, namely ideological, economic, military, and political (hence its name, the IEMP-model). Power, in Mann's terminology, should be understood as the "ability to pursue and attain goals through mastery of one's environment" (Mann [1986] 2012, 6). This definition assumes an understanding of human individuals as rational social agents (cf. Kiser 2006, 62-66). Yet the main thrust of Mann's sociological method is concerned with power *sources*, or what he sees as the principal *organisational means through which humans pursue their goals* (Mann [1986] 2012, 4-6). The pursuit of want satisfaction, understood here in a very broad sense, is a given. The means or resources through which this goal may be achieved are of a varied nature. These, so history tells us, can be defined as pertaining to the four principal types encompassed by the IEMP-model.

Next to these four substantive types, Mann promotes a number of conceptual dualisms to distinguish aspects of their form, extent, and intensity of expression (Mann [1993] 2012, 6-10 for concise definitions). One defines power as the interrelation of two distinctive forms either exploitative or functional in nature. These are the *distributive* (power over people) and *collective* (power through people) aspects of organisational power, emphasising the dialectic cooperative and compulsive nature of most organisational forms (Mann [1993] 2012, xi, for related applications in archaeology, see Blanton and Fargher 2008, also Blanton 2011, Carballo *et al.* 2014). Another illustrates the socio-spatial extent of social power, and qualifies these as either *extensive* or *intensive* in nature (Mann [1986] 2012, 7-8). This dualism relates to the stable impact of power over a given social space, as a continuum between extensive socio-spatial reach and intensive power over a minute transect of social space. For example, whereas organised coercive power will take on an intensive form within the immediate vicinity of an army, the same level of intensive control is only potential at a greater, more extensive distance from it. A third dualism encompasses *authoritative* and *diffused* types of power, and distinguishes between conscious, direct exertions of power and the dissemination of power structures through norms or practice. Standardised coinage, for example, may be said to embody an authoritative power infrastructure in the sense that it is the intentional result of a means to control a medium of economic exchange. On the other hand, the regular appearance of Abbasid *dirham* in hoards in Viking Age Scandinavia can only be meaningfully interpreted as the material expression of a diffused power form (for the use of Early Islamic coinage in Scandinavia, see e.g. Gullbekk 2008, 161-162). As I use these qualifications extensively, it should be noted that they are not oppositions of mutually exclusive values. Rather, they illustrate a conceptual continuum between two extremes, in which various aspects of the expression of power can be considered.

4.1.3 Networks and infrastructures

The four types of social power and their aspects guide the identification of two types of social relations central to Mann's historical analyses, namely social *networks* and social *infrastructures*. Networks constitute the relational complex of similar social agents or communities. I make no a priori qualification of a social power network. A network can, for example, equally be an authoritative or diffused expression of a given power source, e.g. members of a church or followers of a belief system. I use the concept of network rather as a starting point for recognising that agents are performing comparable and relatable actions. The relation of patterned examples of social action, i.e. networks, is the foundational concept for Mann's understanding of social complexes; social complexes, or societies, are constituted by the relations of overlapping networks of social interaction (Mann [1986] 2012, 1-3).

Infrastructures conceptualise the *materialisations of social organisation* in the widest sense. Mann uses the term most explicitly in relation to the socio-spatial extent of political and military power, in order to capture the patterning effect of practices nested in material horizons, and how such practices, linked to the material properties of technology and organisation, serve to shape social actions (e.g. Mann 1984, for views on the infrastructural power of the state). I use the term in reference to observable patterns in material culture, and by inference the physical expressions of social organisation (for an application of this perspective to material culture studies in archaeology, consider Schortman and Ashmore 2012, Schortman and Urban 2012, Schortman 2014). As with social power networks, I qualify infrastructures as related to authoritative and diffuse aspects of social power; the former being e.g. the organisational structure implied by cadastral texts or the production of standardised measuring units, the latter the custom of issuing gifts to travelling envoys or the use of common dating systems. Whereas the former examples are expressions of direct organisation of the material world, the latter are manifestations of collectively maintained, yet not necessarily collectively controlled, material practices. An infrastructure, in other words, is the material expression of a certain type of social action.

4.1.4 Institutions and organisations

We have now established the relationship between social relations, typified as networks, and their material manifestations, typified as infrastructures. In talking of institutions and organisations, I use these terms as conceptual expressions of the *interrelation and –dependence of any given social network and any given set of infrastructures*. Institutions and organisations signify the historical crystallisation of distinct social power networks, expressed through their association with, or formation or alteration of, social infrastructures. An important distinction is made here between *institution* and *organisation*. Recall again the separation of authoritative and diffuse expressions of power, and how these relate specifically to degrees of control and the purposive exercise of power. This distinction may be clarified by turning to institutional economics. In the writings of Douglass C. North, institutions are “humanly devised constraints that shape human interaction”, whereas organisations are “purposive entities” (North 1990, 3 and 73 respectively). Organisations are distinct from institutions in that they are purposive, historically distinct social power formations, for example a state apparatus or a mercenary army. I employ the concept of organisation here in contrast to institutions, as the latter is a diffused power network, whereas the former is purposive, or authoritative. My notion of an ‘institutional household’ seeks to convey a sense of both aspects, namely a tangible organisation nested within a more widely diffused tradition of political agency and economic practice.

4.1.5 Defining the infrastructure of the political economy

With reference to the concept of a social, and in the present case chiefly economic, infrastructure, I use the administrative cuneiform assemblages from the six study sites to outline organisational patterns of the economic management of the political economy. In particular, my aim is to assess the scale of resource circulation within segments of the institutional household economy, through the identification of distinct processes of production, circulation, and consumption of resources as these emerge from the administrative record. Drawing together individual managerial processes, for example the disbursement of grain next to the disbursement of beer next to the disbursement of wine, I then trace the outlines of a general organisational infrastructure of the institutional household, with reference to three broad sectors of economic activity, namely the urban environment, agricultural hinterland, and livestock and herding. This part of the analysis is presented in Chapters 6, 7, and 8. In Chapter 9, I draw out principal proxies to discuss the overall scale of institutional household economies found at the various study sites, in relation to each other and in comparison with the subsistence needs of the parent settlement and the associated micro-region.

By adopting a formal and comparative approach to six different case studies, we can then evaluate the scale and nature of individual processes of resource circulation and their aggregate interrelations, as a working economic infrastructure, as these emerge from the administrative record. In so doing, I focus primarily on the number and characteristics of the individuals or groups related to a given process of transaction, the scale of resources appearing in said transaction, and the regularity with which it appears in the textual documentation. I elaborate more on my approach to primary textual sources in the next chapter. In the next two sections, we will consider the tools relevant for our analysis of archaeological datasets, namely with regards to parent site and micro-region.

4.2 Generating site biographies

Collating perspectives on textual documentation and the archaeological record starts from a detailed examination of individual sites. We must necessarily understand the particular characteristics of both datasets in order to integrate derived information within a wider regional frame. The notion of site biography used here is related to concepts of settlement archaeology or "the study of social relationships using archaeological data" (Trigger 1967, 151). Though I rely extensively on textual information, my perspective is the same, and conceives of and approaches a settlement as both a physical place and a place of social spheres, of actors and systems (McMahon 2009, 13). In the preceding chapters, I reviewed the situation of the individual study sites within the wider environmental and historical frame of the Bronze Age Middle East. Further simplifying the selection of ecozones discussed earlier (see 2.2), the six study sites can be located within either of three landscape categories (Table 4.3). These can be further differentiated when adding in historically specific social infrastructures. The relative proximity of various environmental niches, piedmont, plains, riverine and desert add further complexity, as do historical interconnections across the general region.

Landscape	Main features	Study sites	Rainfall
Piedmont	Alluvial valley floors demarcated by montane areas. High levels of rainfall, access to upland pasture and woodland. Mixed agricultural regime, comprising barley, wheat, and pulses.	Alalah, Šušarrā	400-600 mm
Plain	Open steppe, intersected by perennial and intermittent streams. Reliable rainfall, with emphasis on barley cultivation and pasture of sheep and goat.	Ašnakkum, Qaṭṭarā, Šehnā	300-400 mm
Riverine	River valleys in areas with low rainfall, irrigation agriculture with adjacent arid steppe used for winter pasture	Tuttul	< 200 mm

Table 4.3: Signature landscape types and their association with the six study sites

With a firm understanding of landscape configuration in place, let us consider commonalities in terms of site morphology and formation processes (Table 4.4). This will serve to point out relative agreement in size and estimated population, and can also be used as a benchmark against which to consider micro-regional settlement patterns. Morphologically, all of the six cases here are mounded sites with a settlement history dating back at least to the Early Bronze Age, if not earlier (Alalah is a debated exception, see e.g. Batiuk and Horowitz 2010, generally also Wilkinson 2003, 108-109). Alalah and Ašnakkum are singular, elongated mounds, while Tuttul, Šehnā, and Qaṭṭarā also include extensive lower town areas with different histories of formation. Šušarrā included multiple smaller mounds adjacent to the main tell (Eidem 2013). With regards to size, the six study sites constitute two groups of small (5-10 ha) and large (20-40 ha) towns (cf. Wilkinson *et al.* 2013c, 44-49). The scale of the individual settlements reflects a multiplicity of occupational trajectories (Figure 4.5). Tuttul and Šehnā are both extensive late 3rd millennium BCE tells. In the latter case, the settlement decreased from 90 ha comprised within the Early Bronze Age ramparts to a tentative 35 ha during the Middle Bronze Age. Qaṭṭarā demonstrates an opposing trend, expanding from a mere 3 ha Early Bronze Age main mound to encompass a circumvallated 28 ha by the beginning of the 18th century BCE.

ID	Name	Modern	Area (ha)	Description
ALA	Alalah	Tel Açana	19 ha	Single, elongated mound
TUT	Tuttul	Tall Bīʻa	38 ha	Complex mound, walled
ASZ	Ašnakkum	Tall Šāghir Bāzār	7 ha	Single, elongated mound
SZE	Šehnā	Tall Līlān	35 ha	High mound and lower outer mound, walled
QAT	Qaṭṭarā	Tall al-Rimah	28 ha	High mound and lower outer mound, walled
SZU	Šušarrā	Tall Šimšāra	10 ha	High mound and lower outer mounds

Table 4.4: Overview of study sites, site extent, and site morphology

4.2.1 Settlement size and population

As I wish to assess the scale and extent of institutional households relative to their social context, I rely on approximate figures of settlement population as a function of site size - for the study site in isolation and for the associated micro-region in aggregate – to provide a common denominator for institutional household economies. Comparing numbers derived from textual sources with estimates derived from site size or sustaining area is a fairly common way of assessing relative scales of agricultural economies in Ancient Near Eastern research. The main problem is that such analyses tend to be applied at a local, rather than a regional level (for a rare comparison of two examples, see Sallaberger and Pruß

2015). The fundamental discussion on the economic scale of the Ba-u$_2$ Temple of mid-3rd millennium BCE Lagaš is a typical example. The initial study by Schneider (1920), based in turn on calculations made by Deimel (1931), compounded numbers from cuneiform assemblages and estimates of the agricultural land available to the city of Lagaš (for critique and revisions, see especially Diakonoff 1952, 1969, Gelb 1969, Foster 1981). The pioneering work of Adams (1965, Adams and Nissen 1972) provided a more refined basis for assessing settlement population and sustaining areas in the alluvial plain (see for an insightful analysis of Uruk and its hinterland e.g. Adams 1981, 85-88). These have formed the basis for more recent observations on the scale of institutional economies at Umma during the Third Dynasty of Ur. Van Driel reconstructed the likely catchment area of Umma through an inspection of archaeological survey results and compared this to the number of textually attested plough teams and the extent of the agricultural hinterland these would be able to cover (for the textual sources, especially van Driel 2000b, 88-91, see here also Hunt 1987). A similar approach has been applied to dry-farming environments around Early Bronze Age Tall Baydār in the western Khabūr Basin (Widell 2003, also Widell *et al.* 2013a, 58-62).

4.2.1.1 Estimating site size through field survey and remote sensing

Calculating population densities from site size necessitates a brief discussion of the methods used for estimating the extent of sites. Site extent can be estimated in two ways, namely through surface inspection and in-field collection of material remains, or through remote sensing, e.g. through analysis of high-resolution aerial and satellite imagery, or printed maps. The first method typically involves measurements of length and width of the site as recognised during archaeological field survey. Survey gazetteers will give these measurements in text form, sometimes accompanied by comments on shape and morphology or by sketch maps. Where no information on site shape is supplied, we assume an ellipsoidal form. This relies on the formula $\pi \times R \times r$, where R is the radius of the site measured at its longest axis (length) and r is the radius of the site measured at its shortest axis (width) (Lawrence 2012, 55). While we cannot assume the derived area measure to be precise, comparisons between estimates drawn from field survey and estimates drawn from Corona imagery generally agree when allowing for a relatively small margin of error (Lawrence 2012, 54-56).

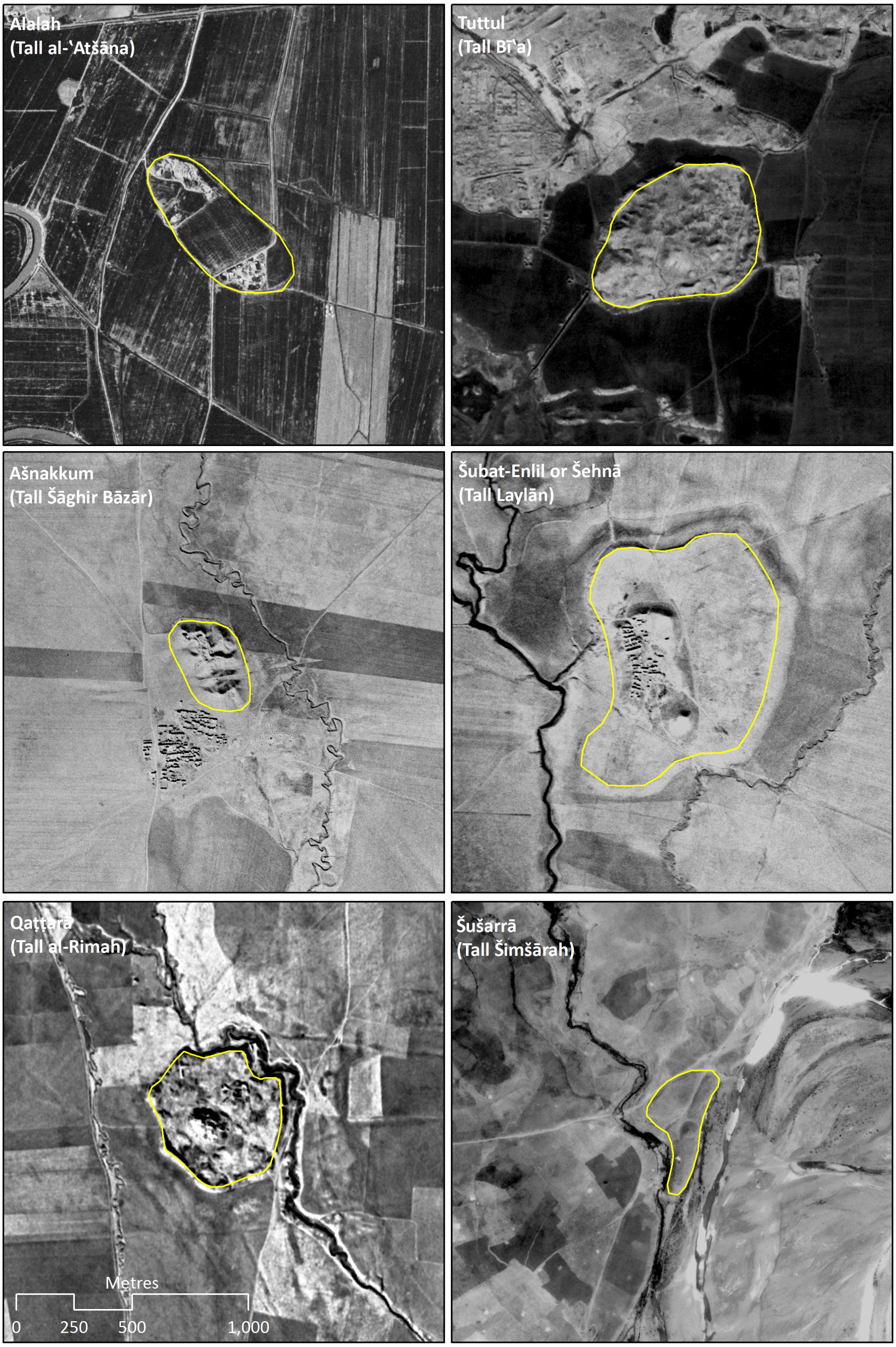


Figure 4.5: Overview of study sites from Corona KH4 and aerial imagery (to scale). Cf. Table 4.5 below for imagery details.

The second relies on the visual examination of high-resolution aerial or satellite imagery to demarcate site extent. Given the relatively narrow historical transect under consideration here, imagery has been used to collate field survey results rather than to consistently map and define sites not previously recorded, as the latter cannot be dated with the necessary degree of accuracy. The visual recognition of archaeological sites through imagery analysis is further complicated both by morphological processes and by the quality and nature of the imagery itself, matters which have been comprehensively discussed elsewhere (Lawrence 2012, 61-64).

4.2.1.2 Average population density

Knowing the area of a given site, we can calculate the approximate settlement population. The present study assumes a local population density of 100-200 persons/ha. Population density values in archaeological research logically fall across a wide spectrum depending on the region and period under consideration (Zimmermann *et al.* 2009, 373-378). Studies relating to the Ancient Near East have employed figures anywhere within the range of 100-400 persons/ha within a settlement, a spectrum too broad for meaningful analysis (Postgate 1994, 79-80, also van de Mieroop 1997, 94-97). Further problems arise when adding in local environmental variables, external sources of subsistence goods, and social configurations nested in settlement hierarchies, i.e. between hamlets, villages, towns, and cities (Adams 1981, 50-51). Population densities found in the alluvium derive primarily from the surveys of Adams, who drew extensively on ethnographic comparisons and demographic data from early 20th century Iraq. In their study on the Uruk countryside, he and Nissen utilised a low figure of 100 persons/ha for minor sites with reference to average population densities in contemporary Khuzistan (Adams and Nissen 1972, 28-30). Demographic surveys made prior to World War I, gave a figure for rural settlements well below 200 persons/ha, but also noted a markedly higher density for large urban sites (>60 ha). Here, numbers well above 400 persons/ha were observed (discussed in Adams 1981, 349-350, cf. Chap. 344, n. 341).

For the Bronze Age Jazīrah, Wilkinson has suggested an average population density of 100-150 persons/ha as an agriculturally sustainable population density for large sites, while 200 persons/ha would have caused a severe deficit in years of low agricultural yield (Wilkinson 1994, 495-499). Kalayci has recently suggested that Early Bronze Age settlement systems were much more capable of fending off local grain shortages, hence casting some doubts on the population ceiling proposed by

Wilkinson (Kalayci 2013, 223-233). Acknowledging the potential hazards emerging from models using a population density of 200 persons/ha, the MASS Project utilised a range of 100-200 persons/ha for Early Bronze Age communities in the same general region (Wilkinson *et al.* 2013c, 49). Based on a case-study of Tall Baydār, the authors do, however, find the collation of results derived from a variety of approaches to fit best with an average 100-150 persons/ha (Widell *et al.* 2013a, 58-62). Paulette introduces site-specific figures, while maintaining a standard range of 100-200 persons/ha (Paulette 2015, 50). A recent study, based on excavated Early Bronze Age housing units at Tall Baydār, has convincingly suggested a substantially higher rate, at 200-600 persons/ha (Sallaberger and Pruß 2015, 110-111). Yet the general impressions drawn from this brief survey favours a population density range of 100-200 persons/ha, with an emphasis on the lower half of the spectrum applicable especially to rural sites.

4.2.1.3 Subsistence needs

Site consumption is a function of settlement population and average subsistence needs. Adams considered average cereal consumption in Khuzistan villages at 278 kg of barley per individual per year in conjunction with data on minimum subsistence allowances from the Third Dynasty of Ur at around 300 kg per individual per year (Adams 1981, 86 & 146). Ellison's important review of Bronze Age dietary patterns suggests a stable rate of one to two litres of barley per day for male and female adults, equal to c. 240-475 kg per year per individual (cf. Ellison 1981, 40-41). Stol, in a more recent review of the Middle Bronze Age corpus, adopts the higher figure (Stol 2004, 973). Assuming that a ration of two litres of grain per day includes a relatively substantial surplus intended for exchange for other resources that individuals would have needed, the derived annual subsistence needs of c. 475 kg for a full-grown male makes sense (for a recent reappraisal of this argument, see Paulette 2013, 105 with further references). As I demonstrate later (see 6.5), an analysis of grain allotment sizes from Ašnakkum, Qaṭṭarā, and Šehnā suggests the average annual subsistence allowance of an adult female to have been c. 300 kg and that of an adult male 375 kg. I use the latter figure in calculations on subsistence needs for sites and settlement systems throughout this study.

4.2.1.4 Average agricultural yield

There are, of course, numerous variables to take into account when estimating agricultural yield. Soil composition and precipitation patterns, along with the, sometimes extreme, inter-annual rainfall variability characteristic of the region evidently had an impact on agriculture also in the Bronze Age (recently Fiorentino *et al.* 2012, Riehl *et al.* 2014). For the Late Bronze Age Khabūr River, Reculeau has been able to detect variation in yields for fields surrounding Dūr-Katlimmu (Reculeau 2011, 205). Adding to ecological circumstance are socio-economic structures, notably local practices of land tenure, organisation, and workforce (for various accounts of Bronze Age land tenure, cf. for the Middle Euphrates Valley van Koppen 2001, for the plains near Kirkuk, see Zaccagnini 1979). The use of the seeding plough (see 7.3.1.2) in Early Bronze Age land tenure in the alluvium, and the use of the common ard and broadcast sowing in the dry-farming plains problematizes direct comparison of yield rates relative to sowing-rates (Potts 1997, 81-82, Widell *et al.* 2013b, 84). From the Bronze Age Khabūr Basin, there exists little in the way of textual documentation on harvest yields. For mid-2nd millennium BCE Nuzi on the plains near Kirkuk, recent reviews of the textual documentation has stressed the reliability of attested barley yields in the range of 600-700 kg/ha, with an implied sowing rate of ca. 85 kg/ha (Widell *et al.* 2013b, 84). These numbers tally with Wilkinson's earlier figures, namely the range of 600-800 kg/ha with a projected sowing rate of 60 kg/ha (Wilkinson 1994, 497). Padgham's recent study of Late Bronze Age economies in the Mediterranean offers a wider and comparable range of figures (Padgham 2014, 131-134). These numbers assume biennial fallow, though there are, as of yet, no conclusive references to fallowing in the cuneiform record from the Early and Middle Bronze Age Jazīrah. The practice is documented in Middle and Neo-Assyrian periods (Fales 1990, 119-121, Reculeau 2011, 189-190), and there are good reasons for it to have been common in earlier periods as well (see e.g. discussion of modelling results in Wilkinson *et al.* 2013a, 183-185, for a global perspective, see Mazoyer and Roudant 2006, 217-258). Since we assume biennial fallow to be a common practice and applicable to institutional and non-institutional agriculture alike, it has no critical impact on the comparative scale of numbers arrived at in the present study, except in relation to the extent of agricultural lands. In the present study, I employ a static set of benchmark values to calculate agricultural yield, namely 700 kg/ha for dry-farming environments and 900 kg/ha for irrigation farming. These are conservative figures, and are used for gross comparisons only. In-depth examination of local environmental variables, and here notably precipitation variability in the long-term, will naturally generate more precise, yet less easily comparable figures.

4.3 Assembling micro-regions

Looking beyond the individual settlement, my concept of micro-regions is aimed at comparing the scale and structure of documented organisations in the context of their parent settlement and hinterland (drawing on e.g. Sumner 1990, Earle and Kolb 2010). These are defined according to environmental and, to a lesser extent, socio-spatial parameters. For Ašnakkum, Šehnā, and Qaṭṭarā, the associated micro-region under consideration is defined as an arbitrary zone extending 15 kilometres from the individual study site. This spatial frame has been utilised in several intensive field surveys in the Jazīrah, e.g. at Tall Baydār (with a 12 km radius, cf. Wilkinson 2000a, 1-2) and at Tall Hamūkār (with a 5 km radius, cf. Ur 2010b, 39-42). For Alalah, Šušarrā, and Tuttul associated micro-regions are defined according to topographical barriers, which provide tangible constraints on the distribution and internal association of settlement remains; for the former two by surrounding mountain ranges and upland slopes, and for the latter by the terraces and the dry steppe above the valley floor of the Euphrates and the Balīkh. Again, this reflects traditional survey strategies in upland areas and alluvial zones such as the 'Amuq (Braidwood 1937, Casana and Wilkinson 2005b), the Rānīah (al-Soof 1970) or the Šahrizūr plains (Altaweel *et al.* 2012), not to mention surveys on the Euphrates and its tributaries (e.g. van Loon 1967, Curvers 1991, Kohlmeyer 1984, 1986, for a review of research history, see Wilkinson 2000b). Micro-regions can be further qualified when turning to the textual corpus. For Šušarrā, we assume that the micro-region encompasses the entirety of the Rānīah Plain (following e.g. Eidem 1992, 54-56). For Tuttul, we assume that the micro-region extends some 30 km north into the southern part of the Balīkh Valley to allow for managerial activities within the Samān Plain.

4.3.1 Survey datasets

Within each micro-region, I collate available survey results to provide as complete a picture as possible of Middle Bronze Age II settlement patterns relating to the study sites under consideration (Table 4.5). While several of the study micro-regions are covered by recent and comprehensive archaeological surveys, pertinent settlement patterns of others have to be assembled from a variety of reports (e.g. Ašnakkum), or retraced due to the age of the survey data (e.g. Qaṭṭarā and Šušarrā). The maps below show the various micro-regions and mapped settlements at an equal scale (Figure 4.6), and aptly demonstrate the different levels of intensity and completeness in terms of survey coverage (consider e.g. the site density for various surveys given in Wilkinson *et al.* 2004, 190).

ID	Name	Survey	Date	Area (km^2)	Site/ km^2	Number of sites
ALA	Alalah	Amuq Survey	1993-2002	904.45	0.0773	70
TUT	Tuttul	Various surveys	1981-1995	444.49	0.0405	17
ASZ	Ašnakkum	Various surveys	1935-2002	706.86	0.0141	12
SZE	Šehnā	Leilan Survey	1984-1997	706.86	0.1061	74
QAT	Qaṭṭarā	Afar Survey	1964-1973	706.86	0.0311	20
SZU	Šušarrā	Al-Soof 1970	1955	872.12	0.0298	26

Table 4.5: Overview of study site micro-regions and survey datasets utilised. Site density and total number relates to Middle Bronze Age II data only.

I offer a comprehensive description of data relating to the individual study sites in the appendices, along with a discussion of local historical geography and settlement organisation (see Appendix 1). Utilising the methods outlined above for calculating settlement population, average subsistence needs, and approximate sustaining areas, I propose an overall scale of cereal consumption for the study site in isolation and in aggregate for the associated micro-region (see Chapter 9).

4.3.1.1 Satellite imagery

Checking and collating survey results relies on high-resolution aerial and satellite imagery (Table 4.6). For five of the six study sites, various collections of declassified Corona satellite imagery are available from the FCP database (for an overview of imagery available within the FCP, see Lawrence 2012, 59-64). Corona imagery has revolutionised landscape archaeology in recent decades, and the potentials, methodology, and perspectives have been comprehensively discussed by a wide range of scholars (see e.g. Kennedy 1998, Philip *et al.* 2002, Ur 2003, Casana 2014, Hritz 2014, also Fowler 2013). Corona imagery comprises a unique set of documentation on vast swathes of the Middle Eastern landscape as it looked prior to the onset of industrialised agriculture, dam construction, and increased urbanisation. The extremely high ground resolution allows for the visual recognition of archaeological sites and geological anomalies, while the wide spatial coverage enables comprehensive inspection of large tracts of land.

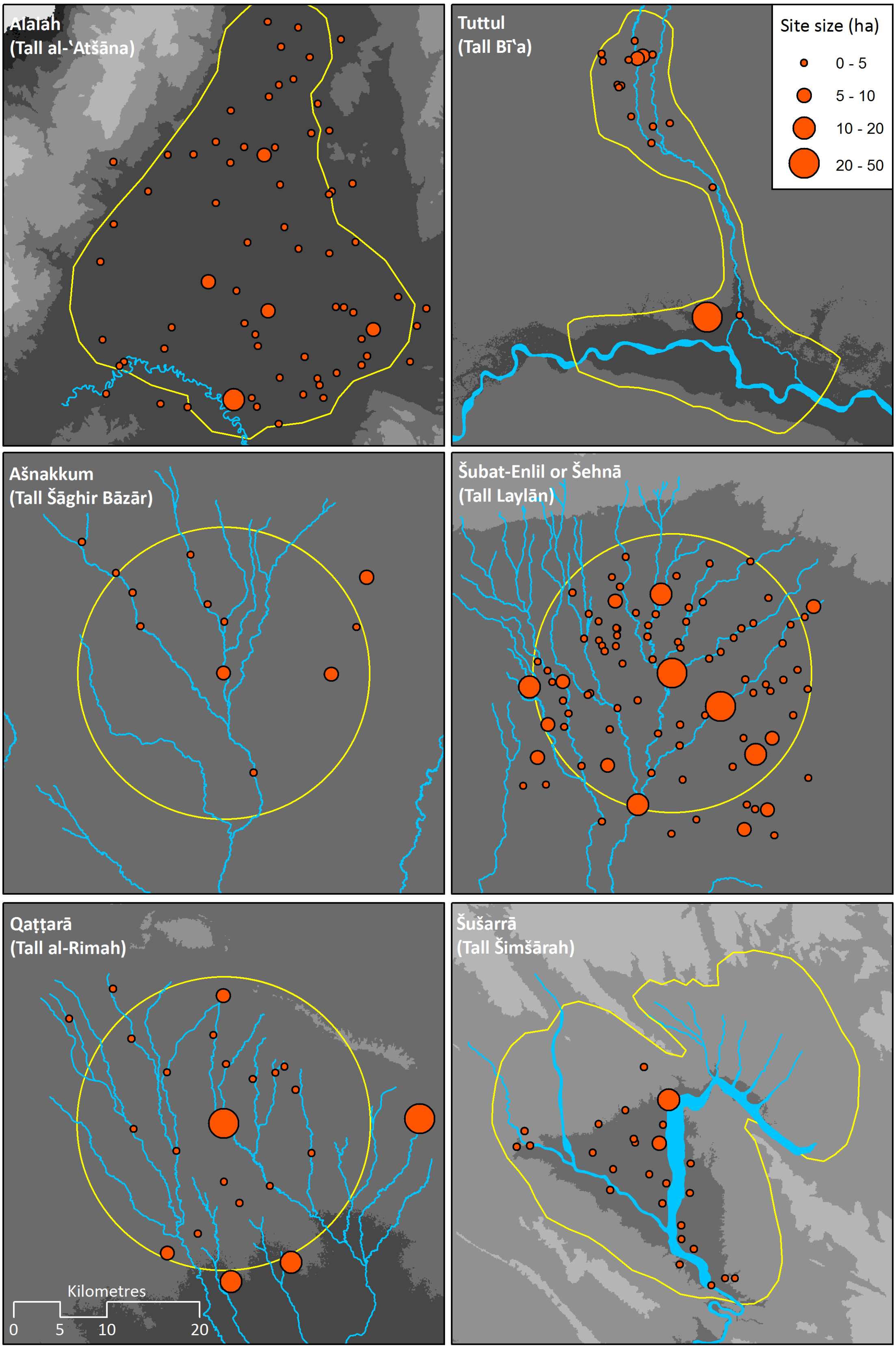


Figure 4.6: Overview of study site micro-regions and mapped settlements (to scale)

4.3.1.2 Aerial photography

In terms of resolution, Corona imagery is able to match most aerial photographs. In a few areas, however, construction works in the first decades after the Second World War present problems. Due to the construction of the Dūkān Dam and the subsequent inundation of much of the Rānīah Plain in 1959, satellite imagery is largely insufficient for assessing the findings of salvage surveys carried out in this area in the early 1950s (al-Soof 1970). Drawing on another resource, absolute location and extent of the Middle Bronze Age settlements around Tall Šimšārah has been established through examination of aerial photographs taken by Hunting Aerosurveys from 1951-53. This material has been made available to me with the kind assistance of Dr. Arsalan Ahmed Othman Aljaf. As the imagery predates both salvage excavations and the construction of the Dūkān Dam, it represents a unique source of information for the understanding of past settlement in this area. The images have been received in digital form and geo-rectified in ArcGIS 10 with the aid of modern high-resolution satellite imagery from Bing Maps (given that the quality of Google Earth coverage for the Rānīah Plain is relatively poor).

ID	Name	Imagery	Date	Resolution (metres at ground level)
ALA	Alalah	Corona 1107 (KH-4B)	July 1969	1.80 – 7.60
TUT	Tuttul	Corona 1038 (KH-4A)	January 1967	2.70 – 7.60
ASZ	Ašnakkum	Corona 1105 (KH-4B)	November 1968	1.80 – 7.60
SZE	Šehnā	Corona 1105 (KH-4B)	November 1968	1.80 – 7.60
QAT	Qaṭṭarā	Corona 1108 (KH-4B)	December 1969	1.80 – 7.60
SZU	Šušarrā	Hunting Aerosurveys	1951-53	*c.* 2.5 – 5.0

Table 4.6: Overview of Corona and aerial imagery utilised

4.4 Social networks and archaeological landscapes: shaping a theory

In the above sections, I have outlined a tripartite approach to the archaeological record comprising three levels of analytical inquiry, namely organisation, settlement, and micro-region (Trigger 1967, Earle and Kristiansen 2010). The twin applications of settlement archaeology and Mann's theory of social power networks serve then first to order the various datasets at different levels of analytical resolution and second to trace and discuss patterning of social action, what I refer to as infrastructures. The aim of this method is to provide a simple and versatile model upon which we can build a regional perspective on economic scale. Employing a tri-partite set of social units, I use the analyses of economic infrastructures given in Chapters 6, 7, and 8 as a basis for discussing economic scale in Chapter 9. Again, the aim of this exercise is to define and deploy proxy variables able to illustrate the relative size of a set of political economies in comparison to each other and in comparison to a formal societal benchmark, namely the parent site and the associated micro-region. A schematic structure of this analytical method and its integration of textual and archaeological datasets, is presented below (Figure 4.7). I simplify then approaches to the social landscape that may be investigated from a variety of angles, attempting to balance a regional and comparative scope with an attention towards local variation. As such, the analytical model advanced here should be viewed as a heuristic tool rather than a reflection of a historical reality. A straightforward association of my three principal analytical units - organisation, site, and micro-region - within a single organism or complex, a community or a state, for example, is not intended. The social landscape, as it emerges from our interpretation of texts and material culture, is constituted by multiple networks of social action, and these are not easily compressed within a single societal model (consider e.g. Smith 2014).

This critical perspective on conceptual holisms also underpins my adaptation of Mann's analytical method and my general exclusion of other theoretical strands often applied to the study of political and economic power in Ancient Near Eastern research (for critical perspectives, see e.g. Smith 2003, Yoffee 2004). As demonstrated in 4.1.1, Mann's IEMP-model works to break societal frameworks often emerging from systemic or functionalist approaches into heuristic concepts more easily associated with specific historical examples, exchanging causality for comparative ability. Similar qualities inherent to Weber's social method, from which Mann draws significant inspiration, are recognised by several authors (Kalberg 1994, articles in Camic *et al.* 2005). Coupled with an awareness of local and regional variation in terms of geography, environment, and social organisation within the landscape, an application of Mann's concept of social power networks within the framework of landscape history and archaeology provides us with a comparative perspective that remains sensitive to local variability (Chapman *et al.* 1996, 9-15). Crucially, it also allows us to appreciate factors such as the intensity and impact of a given power network over time and space, as discussed in 4.1.2 (consider here also Rattenborg in press).

This theoretical frame of reference is less novel than it may seem. The coupling of historical sociology and landscape is a hallmark of French historiography, which draws on input from several fields within the humanities, the social sciences, and geography (Stoianovich 1976, Burke 1990, Burguière 2009, for similar traditions in Germany and the US, see Iggers 2012). Without disregarding direct adaptations of *Annales* historiography to archaeology (Bintliff 1991, Knapp 1992) the regional historical perspective of this tradition is perhaps best known through its incorporation into the 'world-systems theory' of Wallerstein (1974), in turn an extensively used framework for the comparative analysis of ancient societies of recent decades (Stein 1999, Algaze 2005, Hall *et al.* 2011). But this latter strand introduces also a very material and sometimes rigidly Marxist perspective that tends to compress regional diversity into hierarchical models. Its emphasis on the exploitative relationship between centres and peripheries of economic action, while attentive to geographical and environmental differentiation across regions and continents, is less sensitive to the diversity of social agents appearing at a local level. While necessary for broader comparison and the understanding of long-term trends, such simplifying schemes have been criticised for obscuring the myriad perspectives available to the archaeologist and historian alike (Pauketat 2001).

Grounded in a much more data-driven tradition, recent applications of landscape archaeology to the study of the structure and power of the early state has succeeded in bringing together multiple strands of historical and archaeological source material at a regional level (Matthiae and Marchetti 2013, Wilkinson *et al.* 2013b, also comments by Benati 2015). Yet their appreciation of the scale and extent of political economies within the natural and social landscape of the Bronze Age remains predominantly bound to a societal, rather than a social, frame of resolution. Again, the interplay of various agents and infrastructures, and their socio-spatial scale and extent, remains underexposed. Further hampering attempts towards merging comparative sociological and anthropological perspectives are the preferences of a philological discipline which is still struggling to develop approaches to the cuneiform record involving a consistent application of social theory (van de Mieroop 2013, Fleming 2014, more generally also Burke 2005, 1-20). Mann, to my mind, overcomes the problems generated by the different epistemological positions of archaeology and history, of material and text, by developing an interpretive scheme recognising both normative and material power structures, of different intensity, extent, and duration, within a versatile temporal and spatial frame. In the present study, I use concepts extrapolated from Mann's model above (4.1) with reference to definable analytical units derived from archaeological excavation (4.2) and archaeological survey (4.3). Framing the workings of the individual institutional household within a formal interpretive framework, and relating this to standard analytical units across six sites, I attempt to strike a balance between local and historical particularities and regionally comparable characteristics. To this end, it remains for us to consider in more detail the approach adopted here to the interpretation and standardisation of quantitative data from administrative cuneiform texts, as this forms the basis for our understanding of the institutional household and its economic infrastructure. This is the aim of the next chapter.

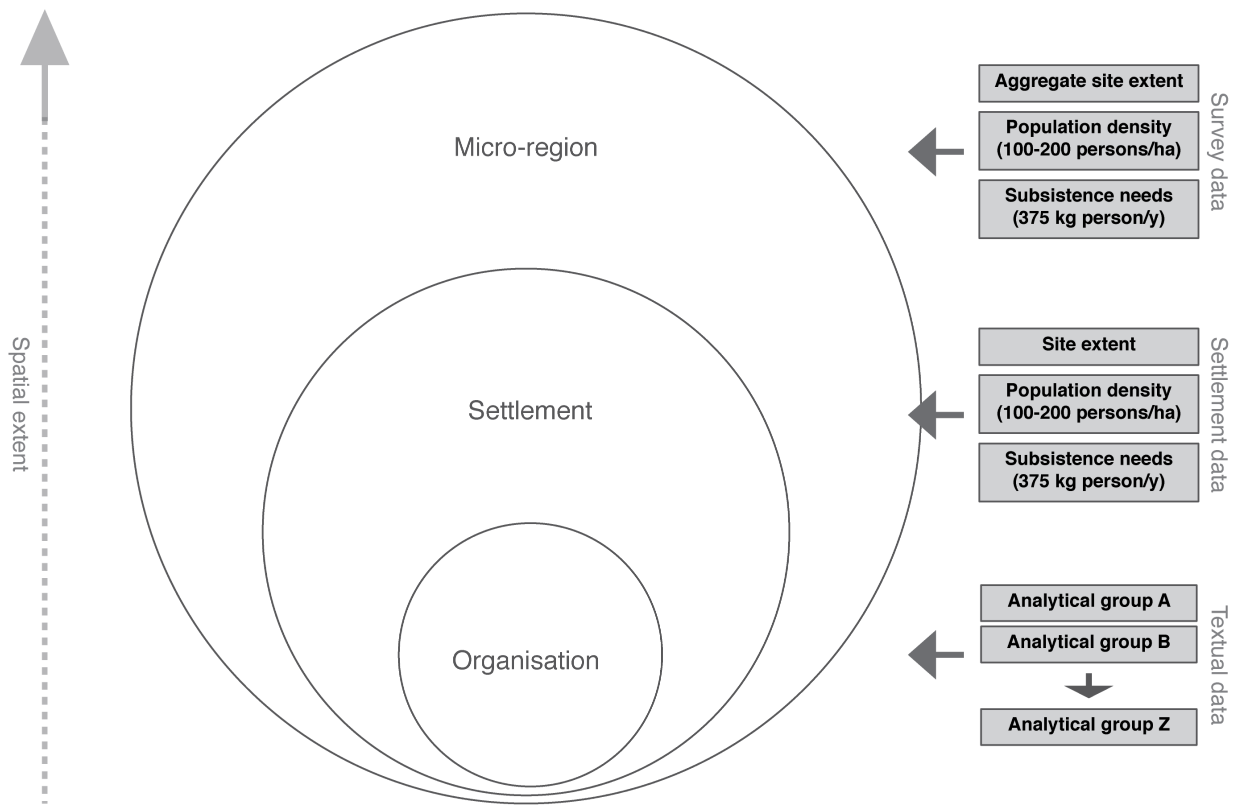


Figure 4.7: Schematic illustration of analytical model for the comparison of economic scale

5 Cuneiform assemblages

The other chief empirical component in our analytical framework is the cuneiform assemblage deriving from the six study sites, and here chiefly the administrative texts. As noted earlier, all of the six study sites, in addition to their commensurable archaeological characteristics, have yielded substantial bodies of texts relating to institutional household organisations. My particular interest in administrative documents stems from my focus on social infrastructures outlined in the preceding chapter, and from this genre's potential as a basis for scalar perspectives on organisation, site, and micro-region. The first part of the present chapter offers a general view on the cuneiform corpus as a whole, which, although bordering on the trivial, serves to point out some unique characteristics in the composition and deposition of cuneiform of relevance for our final discussion (see 10.1). This is followed by a review of typological frameworks for approaching genre, usage, and depositing, aspects that underpin my definition of administrative records as a source of information on quantitative matters, and forms the basis for the formulation of a data structure suitable for their analysis. The latter points are discussed in section 5.2, where I focus exclusively on administrative texts and the associated database developed for this project.

5.1.1 The cuneiform corpus: spatial and temporal distribution

Cuneiform (from Latin *cunei-* 'wedge') is a script utilised throughout much of the Ancient Near East from ca. 3400 BCE – 100 CE to render a number of different languages in written form (for a good introduction, see e.g. Postgate 1994, 51-70). Beyond the alluvial plain of southern Iraq, the language most commonly associated with the cuneiform script is that of Akkadian, better known through its two main sub-branches, Assyrian and Babylonian. Both belong to the, now extinct, East Semitic branch of the Afroasiatic or Hamito-Semitic language family. Cuneiform was originally designed and used for the rendition of Sumerian, arguably the oldest written language in the world, and with no known linguistic affiliation (Edzard 2003, 1-5). There exists no complete or updated survey of all cuneiform sources, as a majority of those known in museums and collections worldwide have yet to be published. A recent estimation arrives at an approximate minimum of 550,000 – 600,000 texts worldwide (as of April 2011), of which around 250,000 are catalogued. An even smaller number have been subjected to conclusive editing and translation. For *catalogued* Akkadian and Sumerian texts alone, a rough estimate arrives at an approximate count of 14 million words (Streck 2010, 53-55). To offer some contextualisation of this figure, 14 million words exceeds that of the entire corpus of Latin texts (in full until 150 CE, selective until 600 CE) by several million (Peust 2000, 253-254, Streck 2010, 38-39). It is close to three times higher than that of all texts from Egypt (hieroglyphic, hieratic, and demotic combined) and is surpassed only by Greek, which, in total, accounts for some 57 million words until 400 CE (Peust 2000, 253).

The above figures illustrate that the quantitative aspects of cuneiform as a source of historical information are palpably different from most other bodies of textual evidence. In contrast to many other types of written media, cuneiform clay tablets are deposited as archaeological artefacts most often as a result of either intentional discarding or abrupt destruction (for a useful discussion of the varied archaeological contexts of cuneiform finds, see e.g. Zettler 1996). Sauvage (1995) has succinctly outlined the complex processes behind the appearance of cuneiform tablets in the archaeological record. Where the preservation of sources from elsewhere in the ancient world is guided by an often intentional selection and alteration of initial compilations of texts leaving us with only a partial and highly biased corpus, the practical result of the exact same practices in the cuneiform world is often the opposite, with source material of a very mundane nature being preserved for eternity.

5.1.2 Sources, typologies, and genres

Cuneiform sources can be divided into a handful of general types of texts. A readable survey by van de Mieroop classifies cuneiform documentation as pertaining to administrative, legal, epistolary, historiographical, literary, and scholarly genres (van de Mieroop 1999, 9-38). The Cuneiform Digital Library Initiative (CDLI) employs a slightly expanded set of categories, which have generally been followed in the present study (Table 5.7).

5.1.3 Formation, usage, and depositing

The formation, usage, and depositing of archives is another variable to consider in the analysis of cuneiform sources. The term ‘archive’ commonly appears with two distinct meanings in the literature, and definitions have been and remain debated in cuneiform studies and elsewhere (see e.g. articles in Veenhof 1986, Pedersén 1998, Brosius 2003, also Charpin 2010b, 98-104).

Data Type	Detail Data Type	Description
Cuneiform Text (Monumental *or* Artefact *or* Tablet)	**Administrative**	Accounting and record-keeping
	Docket/tag	Labels applied to e.g. containers
	Letter	Communications from one party to another
	Legal	Contractual obligations, deeds, debt-notes
	Envelope	Casings, usually used for letters or legal texts
	Literary	Fictitious compositions and hymns
	Ritual	Incantations, rituals, religious compositions
	Mathematic	Mathematical texts and tables
	Royal/Monumental	Ideological narrative or inscription
	Fragment	Genre cannot be ascertained
	Artefact	Inscriptions on artefacts
	Ceramic	Inscriptions on ceramic materials
	Unknown	Text not available

Table 5.7: Data Type: Cuneiform (Monumental *or* Artefact *or* Tablet) categories.

Divergence of opinion stems from the twin understandings of a collection of tablets in the first place as a result of the conscious compilation of individual texts into groups by agents of the past, and in the second as a corpus of texts attested in archaeological excavation and subjected to scholarly examination. A helpful discussion of terminology discerns between three basic frames of reference for defining an archive, namely genre, archaeological context, and social formation (Lauinger 2007, 21-53). With genre, one may distinguish groups of texts by e.g. their literary or non-literary character, a distinction with only limited heuristic value, as a substantial number of cuneiform archives contain both without demonstrating any conscious division between them (see for example Pedersén 1998, 278-280). Genre is a useful distinction in the study of groups of texts, yet cannot be separated from an appreciation of the overall composition of the archive and its social context. A related concept, which will be maintained throughout this study (see 5.2.6), is the concept of a dossier or series as a group of texts within an archive concerned with the same type of action, for example the disbursement of grain rations to a similar group of recipients, or a series of rituals against intestinal diseases (cf. Lauinger

2007, 30-33). With context, we assume that we can only truly talk of an archive when the remains of an archive are found situated in their original, intended location. Thus, tablets retrieved from a secondary context, say, as wall packing or in refuse layers, do not constitute archives (Zadok 1986, 281). This establishes a rather rigid division between primary and secondary contexts of text groups, however, and furthermore ignores attempts at reconstructing archives from dispersed and fragmentary groups of texts.

With social formation, emphasis is placed on the reconstruction of an archive by tracing the social context of its formation, e.g. as the product of a distinct institution, office, agent, or purpose. Several questions arise here, however. In the first place, we should ask whether archives are consciously brought together or accumulated as the result of an arbitrary process (see contrasting of Spar and von Dassow 2000 with Veenhof 1986 in Lauinger 2007, 35-38). In the second, how these processes relate more intimately to the nature and contents of an archive. Much empirical evidence suggests that archives are not, especially in the case of cuneiform sources, formed as the result of one discrete action, say, the repetitive reception of grain. Rather, archives are formed under the auspices of a certain organisation or individual, who can be involved with a number of different tasks.

A focus on formation is adopted here because it allows us to focus on the underlying social processes that produced the archive, as well as the internal relationship of these processes, but also because it provides a good counterweight to approaches too singular in their focus on the intrinsic information of the text. Though virtually all cuneiform archives or corpora are archaeologically or archivally fragmented, this is not by itself a reason for adopting an – almost by default erroneous - arrangement alien to that which may still be partly visible (see Roe 2005, for a modern perspective on archival conceptualisation). A second point is that it is necessary to carefully discern between the archive as an arrangement of sources to structure understanding on the part of the historian on the one hand, and as an element of social practice of agents of the past on the other. Conceiving of archives as a compilation of written records amassed through or as a by-product of certain sets of social actions by an agent or institution places our focus on the interpretation of formation and use of the archive in the past. I return to a more in-depth discussion of the practical implications of this perspective and the specific analytical concepts applied in the current work shortly.

5.2 Administrative cuneiform texts

As noted above, 'administrative' covers cuneiform texts used to account for and manage resources. They are commonly grouped with other archival texts, i.e. letters and legal documents, as these share several characteristics in terms of archaeological and socio-historical context (e.g. Charpin 2010b, 68, also Sassmannshausen 2001, 441-442). In contrast to other types of texts in the cuneiform corpus, administrative documents are both terse and mundane, concerned as they are with repetitive and everyday managerial actions. While they outnumber by far other text genres in just about any historical period, these features account for the very limited attention devoted to administrative cuneiform texts in historical research (van de Mieroop 1999, 13-17). When subjected to scholarly analysis, comprehensive studies of administrative assemblages have generally focused on matters related to lexicography and prosopography and concerned themselves with economic aspects on a qualitative rather than a quantitative basis (consider e.g. observations given by Sassmannshausen 2001). The scale and nature of the resource management which the administrative cuneiform corpus was made to document has received comparatively less attention (van de Mieroop 1999, 106, of course, this statement glosses over important contributions, e.g. the work of the Sumerian Agriculture Group, cf. Powell 1999a, Consider also e.g. Zaccagnini 1979, Zeeb 2001, Jursa 2010, Prentice 2010, Reculeau 2011, Tenney 2011).

Administrative cuneiform records exhibit features that are valuable to integrated archaeological and textual research frameworks. Since they are used to document the recurring receipt, disbursement, and holding of resources, they are generally characterised by three central features; standardisation in format, standardisation in subject matter, and standardisation in time. As serial documents indicative of regularised and recurring actions, they are amenable to statistical and quantitative analysis (for a related perspective, see Anane 2001). As they relate predominantly to the production, consumption, and circulation of material assets of all kinds, they further touch directly on technological and economic matters very tangible in the archaeological record (a juxtaposition of archaeology and text otherwise rare in most historical environments, as pointed out long ago by Hawkes 1954). The empirical core of analyses offered in Chapters 6, 7, and 8 is the dataset produced from the standardisation and integration of information from administrative cuneiform assemblages from the six study sites.

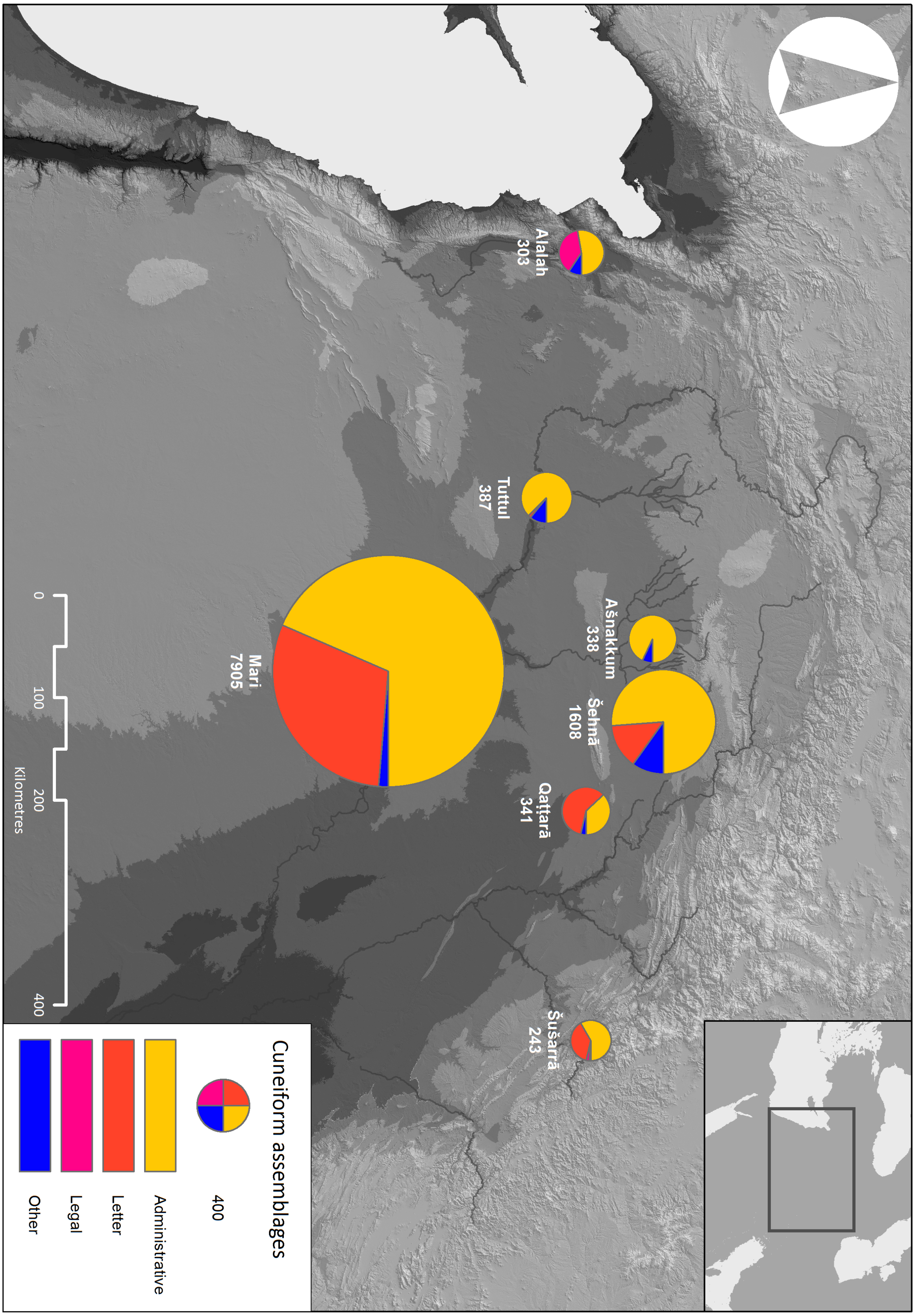


Figure 5.8: Distribution and composition of text assemblages included in the dataset. Figures from Mari (Tall Hariri) added for comparison using data from CDLI.

The details of each assemblage are given in the individual site biographies (Appendix 1), where the reader will find exhaustive surveys of archival composition, subject matter, and archaeological and historical context. To provide some general impressions, let us consider these assemblages in a comparative perspective. The map presented here (Figure 5.8) illustrates some striking similarities in terms of genre composition and subject matter across the six study sites. Administrative records make up the vast majority of individual assemblages (we should note the substantial collections of letters from Šehnā, Qaṭṭarā, and Šušarrā, however). Further, it should be noted that virtually all of these texts stem from an institutional household context, a particularity demonstrated in more detail in the site appendices. Finally, the individual assemblages are, as noted earlier, more or less contemporary in time. The five assemblages from the Jazīrah and the Zagros foothills all fall in the 18th century BCE, and mostly distributed within a timespan of five decades. The assemblage from Alalah dates to the latter half of the 17th century BCE.

I have added complementary data from Mari (Tall Harīrī) drawn from CDLI to provide a comparative perspective on the scale of the dataset considered here, but it should be emphasised that the former is not an integrated part of quantitative analyses presented here. There are several reasons for this exclusion. Environmentally speaking, Mari is far removed from the study region defined earlier, nested within a part of the Euphrates River Valley that skirts the Arabian Desert and the Iraqi alluvial plain. The site is also many times the size of those considered here. In historical terms, the polities that produced the archives found at Mari are, in terms of spatial reach, the product of a much more complex economic and political infrastructure. And finally, the sheer size of the textual assemblage, four times all of the texts from the other six study sites, has prohibited the inclusion of data from Mari texts according to the data structure laid out here.

Returning to the general impressions emerging from this map, the relative agreement in assemblage composition and dating should be considered with reference to additional commonalities pointed out in preceding chapters; the six study sites are situated within comparable environmental and historical landscapes, they belong to a comparable class of local centres, they all housed an institutional household organisation that has yielded a relatively substantial assemblage of cuneiform texts, of which the majority or a large share are administrative in nature, and they are largely contemporary in time. As argued earlier, this shared set of characteristics should encourage us to consider the individual cases in a comparative perspective. The database framework presented below attempts to integrate the administrative text assemblages from the individual sites into a single data structure able to facilitate such a comparative approach.

5.2.1 Database framework

In order to integrate information derived from textual sources within the analytical framework outlined earlier, we require an analytical approach to the cuneiform record able to standardise and compare information across multiple sites and textual assemblages. Most database formats currently used for the study of cuneiform documentation are annotated and referential in nature. Ontologically, these focus either on the inscribed artefact or on the transcribed text. Structures for the generation of related tables of information are predominantly guided towards linguistic and lexicographical matters (an understandable preference in philological disciplines more generally, cf. Hockey 2008). The current approach diverges considerably from such data structures and hence merits some elaboration, both with respects to the data format employed and to the questions this data format sets out to address. The database outline was adapted from the general database template of the Fragile Crescent Project (FCP), which orders and assembles archaeological information within a Microsoft Access-database compatible with ArcGIS (for a recent discussion of this data structure, see Bradbury *et al.* 2015, also Lawrence *et al.* 2012). In practice, data assembly takes place over three steps. First, observations on transcriptions of cuneiform sources are entered into a digital tabular format in Microsoft Excel, employing a selection of data categories and types. Data from these sheets are then checked and cross-referenced through an automated process, before being transferred to an Access-database (for a recent and related approach, see Tenney 2011, 37-39).

The general data structure of the FCP database orders information according to five hierarchically ordered Major ID levels (Table 5.8 and Figure 5.9). Major IDs are expressed as a sequence comprising a three-letter code, a first level number, a second level number, and a third level number, with a fourth level indicated by a letter, e.g. for example ASZ_74_1_33A.

Level	Type	ID format	Example
0	Assemblage	ASZ	Ašnakkum (Tall Šāghir Bāzār)
1	Text	ASZ_74	OBTCB 85
2	Conveyor	ASZ_74_1	Supervising authority
3	Recipient/Deliverer	ASZ_74_1_38	Weaver
4	Resource	ASZ_74_2_38A	Grain allotment

Table 5.8: Ranking of data levels in data structure

Here, the site code signifies Ašnakkum (modern Tall Šāghir Bāzār), the first level number the individual text (in this case OBTCB 85, cf. Talon 1997, 92-97), while the second, third, and fourth levels refer to information internal to the text, e.g. an institution or overseer, with two dependent levels of recipient and resource. The structure of administrative cuneiform sources is well suited for this particular type of data ordering (consider the simple string coding developed for a study of administrative texts from Umma, cf. Stepien 1996, 4-15, also Jaworski 2008, 2012). In order to comprehend the basic agreement between text and the derived dataset, the actual text is interpreted as a set of dependent relationships, in which the resource that is being transferred, be it a sack of grain, a shekel of silver, or a flock of geese, is always located at the fourth level. In practice, the three-letter code and the first level number of a Major ID refers to text metadata, while the second and third level relate to transaction nodes, of which there can be anything from one to (theoretically) several hundred contained in a single text. The fourth level is always the resource transferred or accounted for. The resulting data set offers a simplified structure enabling examination of type, amount, and immediate context of given resources within specified spatial and temporal parameters. As the linking of hierarchical levels is open to different queries – a link can e.g. be established directly between the first and third level, or the first and fourth level – this data structure allows us to standardise and simplify larger groups of quantitative data.

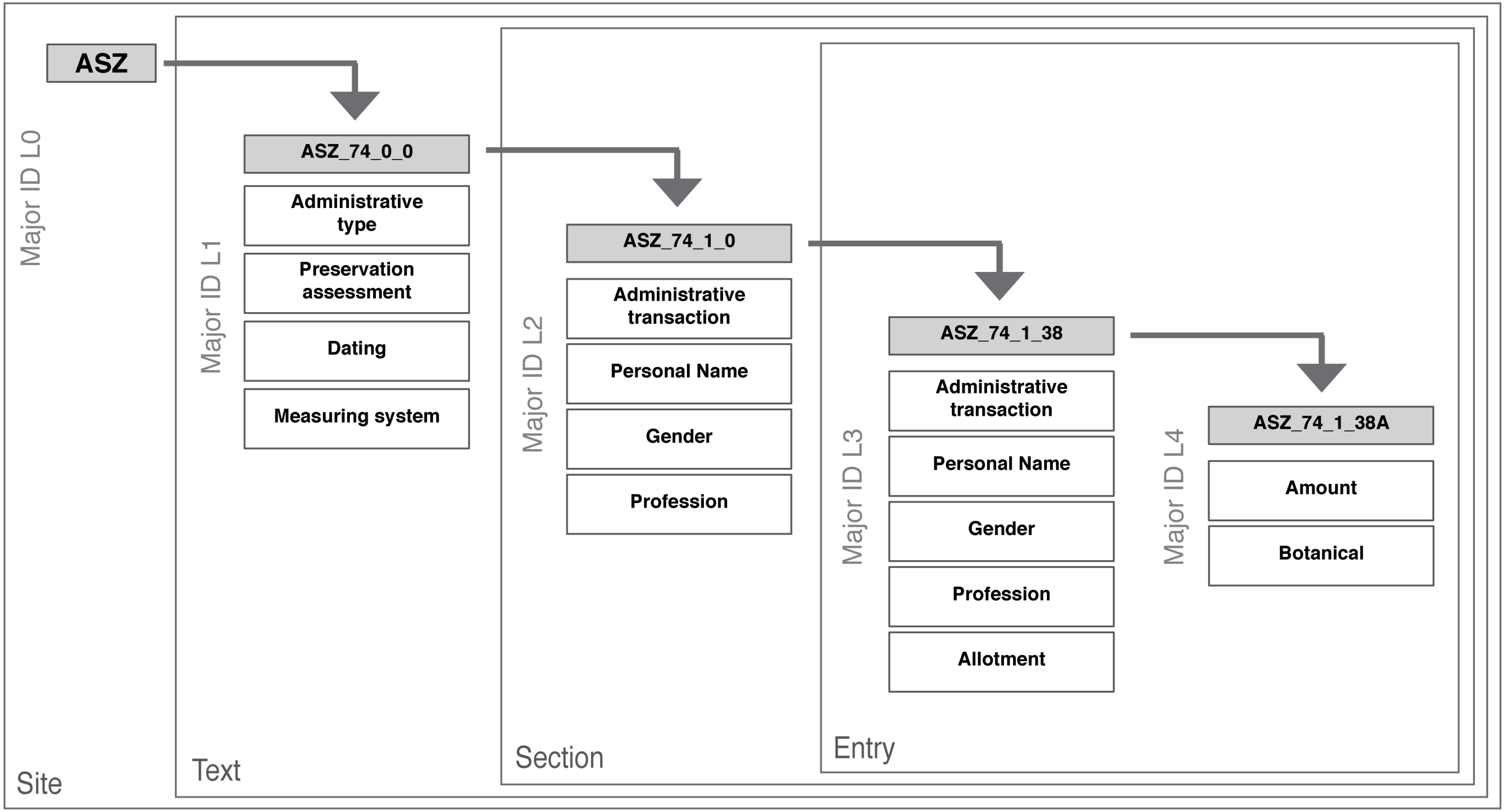


Figure 5.9: Schematic representation of the data structure employed in the analysis of administrative cuneiform texts, showing Major ID Levels and relevant data types as derived from the example presented in section 5.2.2 (see below)

5.2.2 Data interpretation and processing

As an example of the process of interpreting and translating information from administrative textual sources to an analytical database format, let us consider the typical example of ASZ_74_1_38 given earlier. This Major ID concerns one individual in a grain ration list, namely the entry given in OBTCB 85 col. i l. 33, which reads:

> 5(ban2) *be-li₂-du-um-qi₂* 1 munus-tur
> ('5 *sūtu* (to) Bēlī-dumqi (and) 1 girl')

The entry is found under a header giving the supervising authority, a certain Ubāri, of the work gang with which Bēlī-dumqi is administratively associated. The header is interpreted as referring to a conveying entity, and then given the Major ID ASZ_74_1_0, where the second-level digit represents the unit overseen by Ubāri and the overseer himself (the text lists rations for a further two such units, which would then be ASZ_74_2_0 and ASZ_74_3_0 respectively). The entry of Bēlī-dumqi is given the ID ASZ_74_1_38, while the associated girl is referred to as ASZ_74_1_39. To add further information to this entry, let us look at information derivable from elsewhere in the text. The summary of rations given to the gang of textile workers overseen by Ubāri, in OBTCB 85 col. ii l. 31-36, reads as follows:

> 33 anše 1(ban2) še
> še-ba 1 munus 1 anše 1 munus 1 barig
> 1 *šūši* 4 munus 9 lu$_2$ 4(ban$_2$)-am$_3$
> 5 munus 3(ban$_2$)-am$_3$
> 2 munus-tur 2(ban$_2$) 2 tur 2 munus-tur 1(ban$_2$)-am$_3$
> nig2-šu *Ubāri*
>
> ('33 donkey-loads, 1 *sūtu* of barley
> grain rations (for) 1 woman (at) 1 donkey-load, 1 woman (at) 6 *sūtu*
> 64 women, 9 men (at) 4 *sūtu* each
> 5 women (at) 3 *sūtu* each
> 2 girls (at) 2 *sūtu*, 2 boys and 2 girls (at) 1 *sūtu* each'
> office of Ubāri')

Here, we learn that Bēlī-dumqi is a woman (Sum. munus) and receives a grain ration (Sum. še-ba) consisting of 5 *sūtu* (Sum. ban$_2$) of grain, likely barley (Sum. še). From this amount, either 1 or 2 *sūtu* is given to the unnamed girl, which has been associated with the ID ASZ_74_1_39. Given the distribution of the various amounts to the group of people mentioned in the summary, we can assume that the unnamed girl received 1 *sūtu*, in turn leaving Bēlī-dumqi with an allotment of 4 *sūtu*. If we proceed to the grand total of the text, contained in col. vi l. 8-17, we read:

šu-nigin 99 anše 1 barig 1(ban_2) še
ina giš-ban_2 *kinâtē*
še-ba 3 munus 1 anše-am_3
1 munus 1 barig
1 *me* 74 munus 27 lu_2
4(ban_2)-am_3
10 tur 5 munus-tur 2(ban_2)-am_3
5 tur 2 munus-tur 1(ban_2)-am_3
lu_2-azlag-meš u_3 munus-us_2-bar

(‘Total: 99 donkey-loads 7 *sūtu*
in the measure of the menials
grain ration for 3 women (at) 1 donkey-load each
1 woman (at) 6 *sūtu*
174 women (and) 27 men
(at) 4 *sūtu* each
10 boys, 5 girls (at) 2 *sūtu* each
5 boys, 2 girls (at) 1 *sūtu* each
Fullers (male) and weavers (female)

Apart from being given a grand total against which to check the three subtotals given for each work gang, we learn here that Bēlī-dumqi and the girl associated with her are both weavers (Sum. us_2-bar). While male gender is not given in association with individual names in the text, a perusal of the ordering of names and allotment sizes leads to the conclusion that each work gang entry lists the women first, followed by the one individual that receives a donkey-load, followed by the male fullers. To return to Bēlī-dumqi, observations related to her ID ASZ_74_1_38 then appear in the database as shown in Table 5.9. As will be evident from the procedure just described, the observations summarised in the present table cannot be meaningfully compiled nor related with reference to either col. i.33 or col. ii.31-36 or to col. vi.8-17 in isolation. Observations on transaction, name, and allotment size (but not the type of resource allotted) derive from the actual entry, while the subtotal allows us to add observations on gender and resource type, and the grand total, finally, on profession. When employed across a larger set of data, this approach produces a standardised set of information that can be queried to focus on a range of different variables. In the next chapter, for example, I provide a discussion of average ration sizes utilising information on allotment type, gender, and the amount of grain compiled from some five hundred individuals (see 6.5).

Major ID	Data Type	Detail Data Type	Numerical Data 1	Data Comments
ASZ_74_1_38	**Administrative Transaction**	Receipt (juxtaposed)		
ASZ_74_1_38	**Personal Name**	Bēlī-dumqi (be-li2-du-um-qi2)		
ASZ_74_1_38	**Gender**	Female (Sum. munus)		
ASZ_74_1_38	**Profession**	Weaver (Sum. us2-bar)		
ASZ_74_1_38	**Allotment**	Grain ration (Sum. še-ba)		
ASZ_74_1_38A	**Botanical**	Grain (Sum. še)	4	ban2

Table 5.9: Simple overview of a generated data cluster

The hierarchical ordering generated by the data structure is, to a wide extent, value neutral. For the first level, the associated observation relate principally to text metadata, e.g. genre, dating, and physical characteristics. For the third and fourth level, the associated information is essentially a simple link between recipient or deliverer and the associated resource. A problem arises when attempting to satisfactorily account for intermediate levels, that is, for entities located between the organisational origin, on the one hand, and the recipient or deliverer and relevant resource on the other. Theoretically, the number of intermediate links between resource origin and recipient can be next to infinite. From general observations made while assembling the dataset, the number of intermediate levels can range from null to three. Consider for example the often seen example of a given resource issued via (Sum. gir_3) X, at the disposal (Sum. šu-ti-a) of Y, head of section (Sum. kud) Z, and finally allotted to a recipient (i.e. a third level entity). Here, I have made no attempt to alter the data structure to consistently accommodate for all intermediate levels, since examples as the one given above are, on the whole, fairly rare. It is worth noting, however, that the data structure should not be considered an exact replica of managerial organisation with respects to these intermediate levels. For the same reasons, I have not ventured into closer analyses of conveying relationships, in part because this would exceed the scope of the present study, but also because this aspect of the information is more dependent on localised accounting habits, and therefore less reliable in a comparative perspective.

5.2.3 Receipt, inventory, and disbursement

In order to examine the scale of economic activity within the institutional household, we require a framework able to conceptialise the circulation of resources documented in administrative texts. As this study encompasses source material from a range of different locations, each with potentially different practices of accounting and record-keeping, it follows that our categories must necessarily be both simple and functional across an array of different bodies of source material. Consequently, each administrative text in the database is assigned a genre description according to the flow chart given in Figure 5.10. The Data Type ‘Administrative (Type)’ distinguishes between three principal modes of resource flow contained within four general types of administrative texts, namely Detail Data Type: Receipt, Inventory, Disbursement, and Receipt/Disbursement. The characteristics of each of these labels can be summarised as seen in Table 5.10.

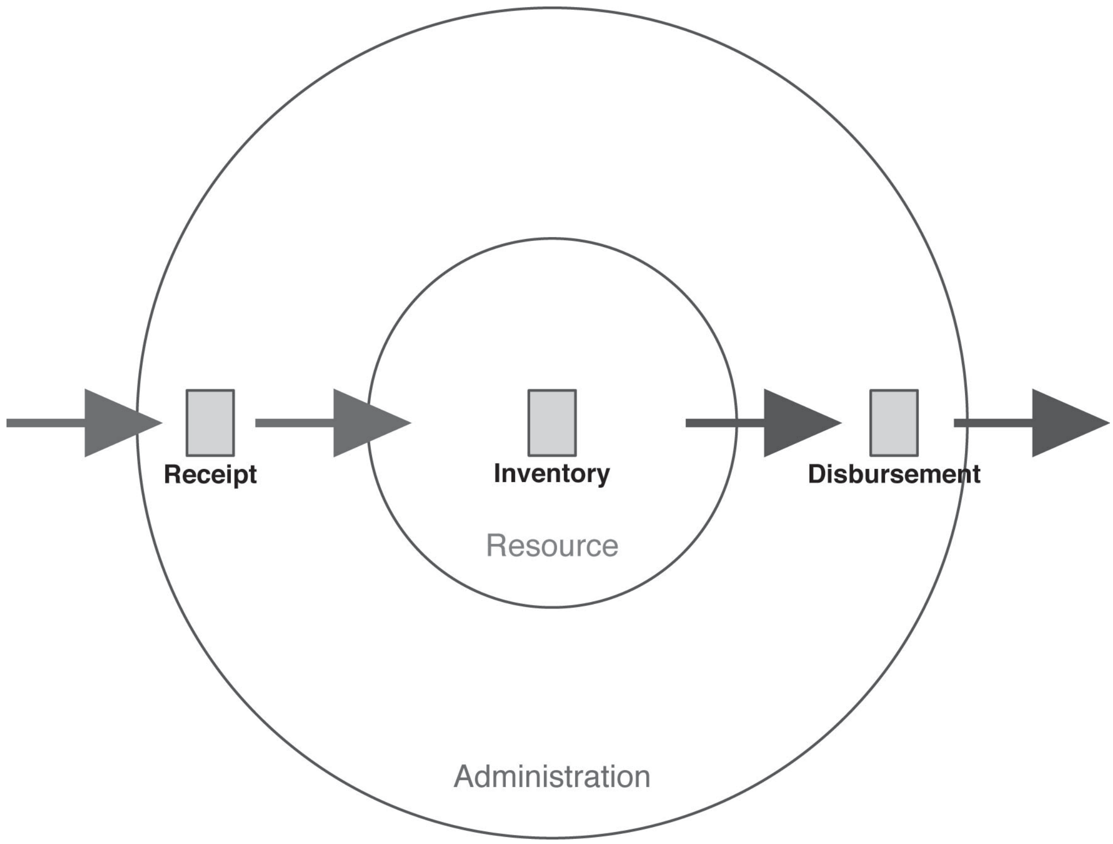


Figure 5.10: Schematic representation of resource flow and administrative text categories

The purpose of this categorisation is to isolate information according to a simple distinction between in-going and out-going movements of resources (similar divisions were formulated in an early attempt at a data-structure for the analysis of administrative records from Mari, cf. Kerestes 1982, see also the use of managerial terminology in Stepien 1996, 9). As such, it is a purely analytical tool, but it is interesting to observe that it applies with relatively minute exceptions to all of the administrative texts under consideration here. The vast majority of these texts are concerned with only one of these three types of action. When evaluating the scale of a particular type of resource transaction, say the disbursement of grain from a specific managerial entity, this typology allows us to separate resources of receipt and disbursement, and consequently introduces a safe-guard against double-counting specific quantities.

Data Type	Detail Data Type	Description
Administrative (Type)	**Receipt**	Signifies a transfer of resources *to* the institution in question, indicated e.g. by a set of entries summarised with the Akkadian stative mahir ('received') or Sumerian mu-du ('delivery').
	Inventory	Signifies an action of recording a given resource currently care of the institution in question, indicated e.g. by Sumerian si-la$_2$ ('inspection').
	Disbursement	Signifies a transfer of resources *from* the institution in question, indicated e.g. by a text summarised with Sumerian zi-ga ('issue')
	Receipt/ Disbursement	A minute number of texts in the sample discussed in the current study accounts for both ingoing and outgoing flows of similar resources.

Table 5.10: Data Type: Administrative (Type) categories

5.2.4 Complete and incomplete texts: sample validity

When dealing with a large and heterogeneous corpus of texts, we must consider the general and particular validity of the texts themselves, as well as that of the dataset derived from the analysis of these texts. Apart from the question of archival coherency (see 5.1.3), the dataset relies on an assessment of text coherency also, namely if texts can be considered either complete or incomplete in terms of preservation. This is mainly important when making quantitative estimates from administrative texts or from singular sources with no complementary parallels, and I have used these categories to a lesser extent than expected in the present study. The dataset discerns between three levels of preservation, identified by the Data Type 'Preservation Assessment'; namely Complete, Fairly Complete, and Damaged (Table 5.11).

The level of preservation, understood as the ratio of complete and nearly complete texts relative to damaged texts, varies according to the individual group of texts under consideration. For the dataset as a whole, approximately half are damaged to some extent, while the other half is complete or nearly complete. 'Damaged' should not automatically be taken to mean statistically unreliable, since the observation applies to the tablet as a complete document, not the individual entries, which may be used in specific queries, e.g. for allotment sizes. As I point out in the discussion, general quantitative patterns in administrative cuneiform records may add some further degree of statistical reliability (see 10.1).

Data Type	Detail Data Type	Description
Preservation Assessment	**Complete**	This label designates a state of preservation where all pieces of information pertinent to an understanding of the entire transaction are present (all the documentation originally contained in the individual text).
	Fairly complete	This label designates a situation where the sequence of entries and an acceptable amount of certainty as to the overall amount in question can be established. By acceptable, I understand a known total number of entries and an aggregate amount of resources either known or restorable from circumstantial information.
	Damaged	This label designates any text not fulfilling either of the former two criteria. In other words, one or more entries are clearly missing, amounts of resources are damaged to an extent prohibiting reconstruction of total or individual amounts, or the information contained in the text is otherwise clearly partial.

Table 5.11: Data Type: Preservation Assessment categories

5.2.5 Assemblage sequencing: temporal ordering and dating

The majority of administrative cuneiform texts are dated to facilitate temporal ordering. This enables us to distribute resource transactions across a specified time range, which may in turn allow for the assessment of average levels of production or consumption on a temporal axis. In general, administrative texts considered in the present study cover a given set of transactions within the span of a day or a month or, very rarely, another specified time-range, for example a period of fifteen days or nine months. Information contained in the dataset can be queried according to preserved dating formulas, also at the level of the individual resource transaction. Specific genres of administrative records are liable to specific dating practices, e.g. beer disbursements, which are typically made on a daily basis, or grain rations, which are allotted by the month. Where parts or all of a dating formula is preserved, pertinent information within the dataset breaks down as follows (Table 5.12):

Data Type	Numerical Data			Data Comments
	1	2	3	
Calendar Date	Day	Month	Year	Dating system

Table 5.12: Data Type Calendar Date

5.2.6 Isolating comparative assemblages: series, dossiers, and archives

We have already discussed means of defining archives as retrieved from archaeological excavation. In the current study, I employ three interrelated concepts in order to isolate distinct groups of texts and facilitate further analytical scrutiny. These are 'series', 'dossier', and 'archive' (Table 5.13). As we have already seen, serialising administrative cuneiform documents for analytical purposes is warranted given their standardised format, and various approaches to this kind of analysis appear regularly in scholarly literature. Defining and using discrete bodies of cuneiform texts in this manner is a common element of the field, yet undertaken with various degrees of rigour and consistency. Talon offers a summary ordering and discussion of discrete series of grain disbursement records in his study of the grain archives from Tall Šāghir Bāzār (Talon 1997), though he makes little attempt at analysis in a formal sense. Reculeau's study on agricultural production at Middle Assyrian Dūr-Katlimmu relies on a series of harvest accounts, and aptly demonstrates the great potential for quantitative analysis held by more coherent bodies of administrative cuneiform texts (Reculeau 2011). Tenney, similarly, recognises a standardised textual format as a basis for serialising information on age, gender, and nutrition in his study of demographics at Middle Babylonian Nippur (2011). Series, dossier, and archive groups identified in the present study, as a basic rule, demonstrate proximity in terms of archaeological context and temporal ordering (i.e. they can be reasonably associated with the same process of archival formation).

Data Type	Description
Text Group (Series)	By ‘series’, I refer to a group of texts that display similarity in terms of layout and information content, for example fodder allotments to the same group of plough oxen.
Text Group (Dossier)	By ‘dossier’, I refer to a group of texts or series concerned with comparable activities, e.g. issues of grain for various groups of individuals and animals deriving from the same body of documents.
Text Group (Archive)	By ‘archive’, I refer to a collection of texts of varying content and nature, assembled and stored together.

Table 5.13: Data Type: Text Group (Series *or* Dossier *or* Archive)

Essentially, these data types facilitate the isolation and investigation of documentation pertaining to distinct managerial units. In analytical terms, series allow for simple statistics on amounts disbursed or received for a specific purpose or group. Dossiers encompass a more diverse body of text formats, related by a managerial focus on a single or related set of resources, e.g. diverse sorts of grain and legumes. Archives are defined primarily with reference to archaeological context, and provide an overview of the full range of materials and actions with which a given assemblage is concerned. The three analytical categories can then also be hierarchically interrelated. At Ašnakkum, for example, distinct series relate to e.g. pig fodder, donkey fodder, and workshop rations respectively. As these are all concerned with grain disbursements, they may be interrelated within a single dossier on grain disbursements. Drawing on archaeological context, another dossier of livestock inventories can be included together with the grain disbursement records as part of a larger archive.

5.2.7 Resource categories: an overview

The number of unique Detail Data Types contained in the database amount to more than 500 unique labels. Far from all of these are discussed in detail in the analyses, and I focus here on parent Data Types relating to material resources, as these are the most important and will provide a good understanding of the general ontology. Resource data comprised within the data set generally relate to five Data Types, namely Botanical, Faunal, Commodity, Utility, and Metal (Table 5.14). These data types establish simple divides between animate and inanimate resources, and between unprocessed and processed goods. For fourth level observations, data on resource type is further accompanied by numerical information on the amount given in the relevant entry, if preserved.

Data Type	Description
Botanical	Botanical are all crops and plant fibres either in un- or incompletely processed state, e.g. grain, legumes, spices, fruits, wood, and straw.
Faunal	Faunal are all live animals, wild as well as domestic, e.g. cattle, sheep, goat, equids, birds, lions etc.
Commodity	Commodity are all processed goods for consumption either for manufacture or subsistence, e.g. flour, oil, beer, wine, fat, salt, wool, meat, etc.
Utility	Utility are all crafted objects of lasting use, e.g. pots, baskets, tools, carts, boats, spears, axes, etc.
Metal	Metal are all bulk quantities of metal, e.g. gold, silver, bronze, copper, tin, and lead. The type of metal is also given in relation to utilities made from metal, e.g. silver rings.

Table 5.14: Data Type categories relating to resources

5.2.8 Interpreting and standardising resource quantities

Quantitative data interpreted and assembled from administrative records forms the mainstay of the empirical basis of the present study, and so some key points on the manner in which quantitative data has been generated is in order. As a general rule, the dataset does not contain redundant attestations of the same amount of a given resource. In other words, quantitative information for a given resource transaction, say, a measure of grain, appears only once for each unique observation. Totals or subtotals (Sum. šu-nigin) of amounts given in individual entries in a text, for example, are never included in the dataset with quantitative information, as this would produce multiple observations on the same unique amount. The underlying premise is that the same amount of, say, grain would never (or, failing that, extremely rarely) be accounted for twice in the same type of transaction.

To provide some quantitative impressions, the dataset generated using this approach, based on the processing of more than 1,500 administrative documents from the six study sites, produces more than 50,000 lines of individual observations. In the following chapters, I rely primarily on information derived from the third and fourth levels of the data structure. As mentioned, the third level comprises recipients and deliverers of resources, for example an individual in receipt of a grain allotment, the produce of a field or a village, or fodder issued for a drove of pigs. Leaving out inventories, where no movement of resources is implied, the number of unique transactions contained in all receipts and disbursement records number more than 6,500 unique entries. The fourth level, which comprises the actual resource concerned, numbers more than 8,000 unique entries, and accounts for measurable bulk resources in excess of 2,500 tonnes (Figure 5.11), and livestock and utilities, counted individually, in the many hundreds. Data was collected from all administrative records from the six study sites that were available in primary editions or preliminary reports. As just mentioned, the bulk of the dataset contains information relating to subsistence resources, namely agricultural products and their processed derivatives, along with a smaller and more irregular set of data on livestock numbers. These two groups constitute the primary basis for analyses undertaken in the next section. The dataset further contains information on a range of other types of materials, especially metals, textiles and crafted artefacts, which are not considered in the present study to any significant extent. The analyses seek first to outline the practices associated with the production, circulation, and consumption of specific resource types, second to assess their material scale and significance with reference to examples taken from the dataset.

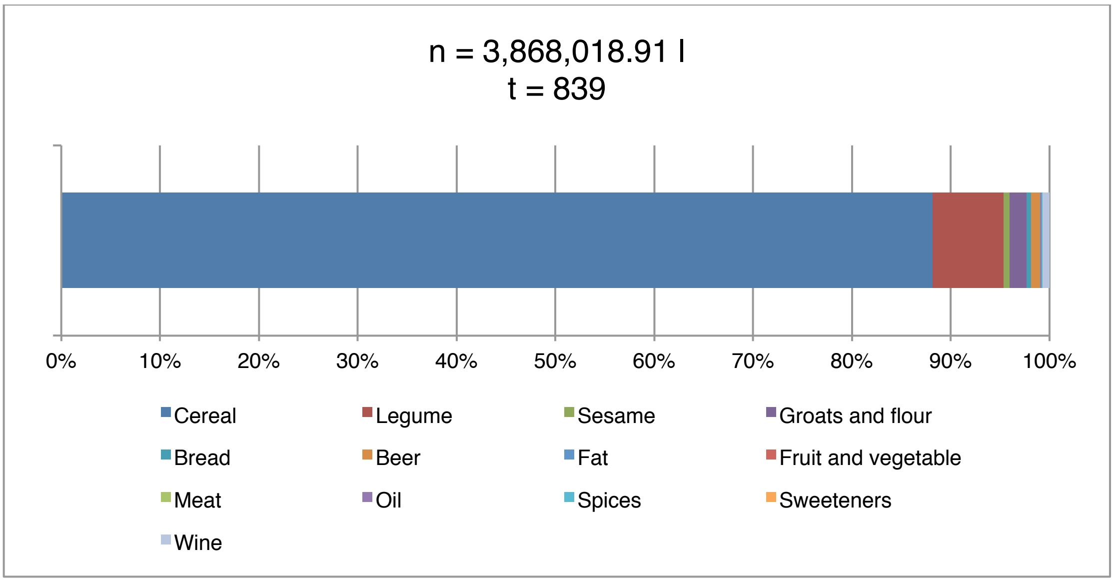


Figure 5.11: Representation of quantities contained in the database ordered in key resource groups

Tracing the institutional household

In concert, the environmental and historical frameworks and the archaeological and textual datasets discussed in the preceding section form the interpretive basis for the analyses advanced in the next four chapters. These deal, respectively, with infrastructures of storage and consumption (Chapter 6), of agricultural production (Chapter 7), of livestock management (Chapter 8), and with the overall material scale of the institutional household in a comparative perspective and relative to parent settlement and hinterland micro-region (Chapter 9). In all of these chapters, my point of departure is the administrative records of the institutional household organisations found at each of the six study sites, which I use as the empirical basis for tracing the managerial infrastructure of given resource types, and for assessing the material scale of resource circulation relating to it. Consequently, my aim is twofold; I outline social practices, environmental particularities, and technological constraints pertinent to the production, management, and consumption of specific resource types, and discuss the scale of particular aspects of the economic infrastructure with reference to quantitative information drawn from the textual dataset. In Chapter 9, I draw together select elements of these analyses to discuss proxies of the overall material scale of the institutional household organisation, using the assembled settlement data for each of the study sites as a comparative measure.

The goal of this section is to develop a comparative perspective on the scale and extent of the infrastructural complexes within which the production, circulation, and consumption of specific resource types are bound. Ultimately, this serves to provide a quantitative measure of resources encompassed by the institutional household organisation, and to compare these impressions with formal societal benchmarks, namely the parent site and the associated micro-region. As I point out in the concluding paragraphs of each analytical chapter, and more coherently in the discussion (Chapter 10), this approach will show that there are tangible differences in terms of the scale and extent of production and consumption of specific resource types, and, further, that there is a surprising level of agreement in terms of overall organisational scale between the historical examples considered here. This, ultimately, raises some critical questions with regard to the economic, and consequently political, omnipotence of early political economies often posited in the literature, and suggests that the institutional household organisation was, in many respects, a much more modest enterprise than is often implied by traditional perspectives, while at the same time representing a significant economic agent within the Middle Bronze Age landscape.

6 Urban households

My perspective upon the cases considered in this study is socio-spatial, rather than exclusively functional. In simple terms, I discuss information relating to individual resource groups on a case-by-case basis according to their place within sectors of the institutional household organisation and the wider community. Consequently, I start from the physical centre of the institutional household organisation, the urban infrastructure, and from there proceed to consider food processing and consumption within the settled environment. In Chapter 7, I expand upon this perspective, to consider economic infrastructures concerned with the production and management of agricultural resources in the hinterland. In Chapter 8, I discuss livestock management, herding, and pasture that reach even further afield. Yet the managerial infrastructure of the institutional household is intimately bound to the archaeological matrix of the parent settlement, by way of the archaeological context of the textual record and by the focus of the administrative practices that emerge from this record. In the present chapter, I review the physical structures that encapsulate the textual record, and then move on to briefly discuss the various groups of peoples and professions associated with the institutional household. I then turn to consider some principal institutions within the institutional household organisation, namely key physical structures and administrative practices characteristic of the managerial infrastructure. Subsequently, I proceed to discuss the nature and usage of the various chief resource groups appearing in the dataset. In the present chapter, these encompass processed goods such as flour, bread, beer, oil and fat, sweeteners, and wine. Agricultural produce, namely cereals, pulses, fruits, and other raw commodities will be discussed in the next chapter (Chapter 7), while animal husbandry and derived products is the subject of the following chapter (Chapter 8).

6.1 The palace

The palace (Sum. e_2-gal, Akk. *ekallu*) is the principal physical manifestation of early political organisations in the Ancient Near East (Postgate 1994, 137-143). As the household of rulers, the palatial structure constituted the physical locus both of a residence, an extensive economic organisation, and the seat of political and ideological power (Pollock 1999, 117-123). Its location within the urban environment often bears testimony to this elevated position, though palatial structures are, on the whole, a less prominent feature in Bronze Age Ancient Near Eastern cityscapes than their religious counterparts, namely the temples (Postgate 2003, 196). Among the settlements considered here, the location of the palatial structure is equally variable. Extensive palatial structures away from the principal prehistoric tell are found at Šehnā, Qaṭṭarā, and Šušarrā, while corresponding examples at Alalah, Tuttul, and Ašnakkum occupied high mounds (on the division of Middle Bronze Age cities into upper (Akk. kirhu) and lower (Akk. adaššu) sectors, see Charpin 1993, Durand291-294, also Stol 2004, 668 with further references, for an archaeological perspective, see Margueron 2013a, 535-539). Palaces at Alalah, Tuttul, and Qaṭṭarā, are clearly defined and self-contained architectural units (for comparative perspectives encompassing the general region, consider Miglus 2003, 246-248 and 256-259). They are also comparable in size (Figure 6.12); Palace A at Tuttul constitutes a rectangle covering some 2,000 m^2 (Miglus and Strommenger 2007). The projected extent of the Area C palace at Qaṭṭarā encompasses ca. 2,500 m2, though this does not cover auxiliary structures around the outer courtyard (see Battini 2001, for an updated study).

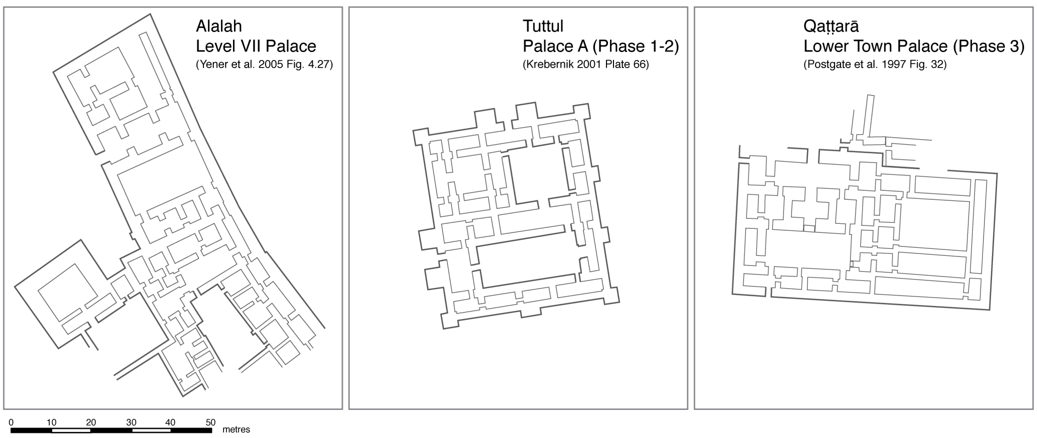


Figure 6.12: Middle Bronze Age palace structures (to scale)

Similarly, the c. 3,000 m^2 taken up by the Alalah Level VII palace should probably be slightly higher when accounting for unexcavated parts of the southern wing (Yener 2005a, 105-106). We have only modest clues as to the arrangement of the Ašnakkum palace, but the perimeter wall suggests a structure within the same general range (see the brief discussion in Tunca 2008, 15). The palace of Šušarrā appears to have been of a similar scale. Finally, we can consider approximate numbers given for the partially excavated Lower Town Palace East at Šehnā. Based on terrain elevation, the excavators suggest the original structure to have covered as much as 10,000 m^2 (Ristvet and Weiss 2011, xix). In comparison, the palace of Zimri-Lim at Mari extended over ca. 24,000 m^2 (Miglus 2003, 247). These numbers, of course, do not take into account the very likely presence of upper storeys (Postgate 2003, 197).

The internal organisation of the palace centres on several open courtyard spaces that also serve to compartmentalise the palatial structure into specified segments, e.g. reception areas, residential quarters, and storage and production facilities (see for a discussion of Zimri-Lim's palace at Mari Margueron 2004, 459-500, for a comparative discussion of Palace A at Tuttul, see Miglus and Strommenger 2007, 67-75). These divisions echo, to some extent, the distribution of the textual assemblage. The location of epistolary sources within the Phase IIIb palace at Qaṭṭarā, for example, underscores the divide between reception areas (in the western part of the structure) and residential units (in the eastern part) (consider Battini 2001, 133-138). The close affinity between administrative assemblages and courtyard areas, e.g. at Alalah, Šehnā and perhaps also at Tuttul and Ašnakkum, mirrors scribal practices more clearly delineated by the Early Bronze Age archives from Ebla (for the latter, see Archi 1986, also Matthiae 2013, 52-54).

The cuneiform record testifies to a plethora of peoples and groups engaging with the palatial complex, including emissaries, courtiers, managers, servants, and workers of various sorts (Postgate 2003, 197-198). Records seldom offer a comprehensive overview of any discrete palatial community, however (see for Mari e.g. Durand 1997, 81-96). Administrative accounts from Ašnakkum offer a rare degree of coherency and shed some light on household composition. For the palatial structure specifically, we can take the tablet OBTCB 80, the only complete example of the records dealing with the palatial residents and servants (see for this dossier Talon 1997, 30-31). This document accounts for a total of 58 persons. Of the 33 servants listed, 14 were tasked with tending to the residents, e.g. stewards (Sum. agrig), gatekeepers (Sum. i_3-du_8), sweepers (Akk. *kisalluhu*), and a female scribe (Sum. dub-sar). Another 20 were occupied with cereal processing, namely 17 grinders (Akk. *ṭē'inu*) and three gleaners (Akk. *lāqit burri*). The listed residents, namely 25 women and children, were relatives of the ruler and four of his servants (Lacambre 2010, 103-105). Accounts from Iltani's household at Qaṭṭarā give comparable figures. In OBTR 207, we count 23 individuals, exclusively females and boys directly associated with the palace (Akk. *ekallu*). Most of these are designated as female servants (Sum. geme$_2$). The following sections of the tablet record 17 weavers (Sum. us$_2$-bar), 10 fullers (Sum. azlag), and five grinders (Akk. *ṭē'inu*). At Alalah, the principal groups in permanent receipt of grain allotments number an estimated 90-100 people, principally servants (Sum. geme$_2$), with smaller contingents of weavers (Sum. us$_2$-bar), and captive workers (Akk. *asīru*) (cf. Zeeb 2001, 218-252 and 692).

6.2 Managerial units

While the palace nucleus constituted a residential unit for the ruler, his relatives, and closest servants, the majority of people associated with the palatial economy were to be found elsewhere, in the workshops, in the fields, and with the livestock (Durand 1997, 81-82). Akkadian *ekallu* can refer both to a physical structure and to a social entity that encompasses the economic organisation in its entirety (Yoffee 1977, 4-6). An illustrative excerpt from a letter relating to the management of an estate in the city of Ekallātum on the Tigris offers some general impressions (cf. Villard 2001, 56, Heimpel 2003a, 288-289):

> "(…) Mašiya is to supervise outside affairs, the field, the ploughs, (and) the grain heaps (Akk. *karû*). This he should supervise in addition, and he is the one who does the accounts (Akk. *nikkassu*). Uṣur-awassu is to supervise affairs inside the city, the storages (Akk. *nakkamtu*), the accounting office (Akk. *bīt têrti*), the craftsmen, the [*workshop*], and the fattening house (Akk. *bīt marî*). (…)"
>
> (ARM 26/2 Text 300 v.09'-19')

This provides us with an exemplary sketch of how administration was organised, and what discrete organisational elements it may have comprised. In spatial terms, the text gives an administrative structure with a basic division between units outside (Akk. *kidû*) and inside the city (Akk. *libbi āli*) (Rattenborg 2012, 25). Corresponding managerial divisions emerge from the administrative assemblage considered here. By disentangling the managerial responsibilities of three key individuals appearing in the Alalah grain disbursement records, Zeeb posits three basic spheres of administration, namely urban household industries, agricultural work, and livestock management (Zeeb 2001, 384-385). More specifically, the individual sections given in the excerpt appear regularly as a framework for administrative accounts and will serve as a template for pointing out some chief administrative divisions comprised in the present dataset.

6.2.1 Workshops

The workshops (Akk. *nepāru*) constitute a common managerial unit within the institutional household organisation, e.g. at Ašnakkum, where at least 20 individuals, and potentially many more, are associated with the workshops (Lacambre 2010, 108-109). In a deed of redemption from Šehnā, a man is released from service in the workshop in exchange for silver (Vincente 1991 Text 32, cf. Vincente 1991, 91-92). A similar situation is in evidence at Šušarrā, where a fragmentary letter tells Kuwari of a messenger whose three siblings are in the workshop (Sh I 32, cf. Eidem and Læssøe 2001, 103). Multiple practical tasks were encompassed within the workshops, and so it is not immediately clear that the term should relate to a specific structure or to a specific function (consider the discussion by Durand 2000, 250-254). Workshops can be understood as a generic reference to grinding, milling, baking, grain managing, gardening and animal fattening, thus covering a substantial tract of everyday work assignments associated with the institutional household economy (e.g. OBTCB 12 and 81. Consider here the analysis given by Talon 1997, 24-29).

6.2.2 Craftsmen

Craftsmen (Akk. *ummiānu*) are also common. The term connotes skilled workers, such as carpenters (Sum. nagar, Akk. *nagaru*), smiths (Sum. simug, Akk. *nappāhu*), leatherworkers (Sum. ašgab, Akk. *aškāpu*), felters (Sum. tug_2-du_8, Akk. *kāmidu*), basket weavers (Sum. ad-kup_5, Akk. *atkuppu*), and potters (Sum. bahar, Akk. *pahāru*), if taking our cue from the grain allotment account OBTCB 12 (these appear as the principal professions also in the Middle Bronze Age alluvium, cf. van de Mieroop 1987, 47-102). At Ašnakkum, these are listed among permanent segments of the institutional household organisation, usually one adult and one apprentice for each craft. They appear more sporadically in the records from Alalah, which may be taken either as a preference of scribal practice or as indicating a certain degree of specialised mobility (Zaccagnini 1983, 247-249).

6.2.3 Storages

Storages are attested by different terms depending on meaning and practical use. Within the settlement, we find primarily granaries and storage houses, that is, installations for the storage of agricultural produce and processed goods respectively. Cereal storages, or granaries, are associated with Akkadian *našpāku*. A similar structure appears at Alalah under its Sumerian cognate, i_3-dub, in allotment records concerned with barley, wheat, and vetch. Another term for cereal storage is the ‘grain-heap’ (Sum. gur_7, Akk. *karû*), most likely, as hinted at by the English translation, a temporary storage located in the fields. General storages are mentioned principally with reference to Akkadian *nakkamtu*. In disbursement records from Šehnā, wine is apparently stored both in a *nakkamtu* and in a 'sealed storeroom' (Akk. *bīt kunukki*), which might suggest these terms to be overlapping (see Ismail 1991, 35-41 and comments to texts 16 and 21).

6.3 Managerial infrastructures

Let us now consider the formation and deposition of the administrative record in light of the various managerial segments described above. Here, I discuss first the spatial association of administrative assemblages and the concrete practices that they document, in order to demonstrate that the textual record can often be very closely associated with specific work areas within the settlement. Subsequently, we will review means of ordering and indexing administrative records, as this issue touch crucially on our ability to reconstruct the economic infrastructure that they document. This includes, firstly, some observations on the way in which administrative assemblages were kept, secondly the use of dating formulas for ordering documents over time.

6.3.1 Archives and storages

Whereas Akkadian *bīt ṭuppi* (lit. 'house of the tablet') is commonly translated 'archive' due to its affiliation with Sumerian e_2-dub-ba, prevailing orthographical practice implies that this compound can also be read e_2-kišib-ba, meaning 'storage house' or 'storeroom'. As the Akkadian cognate may conflate these two meanings, Lauinger has argued that references to tablets stored in 'archives' may in reality refer to storages also containing other commodities (Lauinger 2007, 45-46). He further suggests this to be in the first instance a result of the spatial proximity to various managerial practices, in the second a consequence of the intrinsic value attributed to particular groups of texts, e.g. deeds or loan documents (Lauinger 2007, 280-287). This practice seems rather common. In 20th century BCE Isin, recurring deliveries of crafted tablet containers to the main storages (Sum. e2-kišib-ba), where an array of different raw materials used by the city's craftsmen were also held, indicate that archives and commodities were kept together (van de Mieroop 1987, 107). The same practices can be applied to a domestic setting, as exemplified by e.g. the business archive of a loan shark from 19th century BCE Kaneš in central Anatolia, kept in a subterranean storage room together with pottery vessels and other commodities (Özgüç 1953, 299-300). A contemporary example mentions the inspection of the house of a deceased merchant, in the course of which creditors opened his storage (Akk. *maṣṣartu*) and took "silver, gold, and tablet chests" (TCL 21, Text 270 v.19-22).

These examples indicate that managerial records were often located in spatial proximity to the manifest aspects of the practices to which the texts themselves referred (consider e.g. Sasson 1972, 55-56 for comments on administrative assemblages at Mari, for an opposing view based on the administration of the Third Dynasty of Ur, see for example Steinkeller 2004, 68). Contextually secure bodies of tablets from Ašnakkum, for example, derive from different physical structures, even if their subject matter can be closely interlinked. The majority of the beer disbursement records from the site derive from two pits dug into an exterior walking surface within the palatial precinct (Tunca 2008, 10). These texts evidently relate to the brewing of beer for residents, servants, and visitors of the palatial nucleus. A good comparison derives from the Qarni-Lim Palace at Šehnā, where a similar body of textual documentation was also found within a palatial unit (van de Mieroop 1994). The second sizeable assemblage of cuneiform texts found at Ašnakkum stems from a room in an only partially excavated structure some 50 metres west of the palace precinct, and deals almost exclusively with issues of grain. This suggests a spatial division between resource management within and outside the palace structure proper. With regards to grain consumption, this point can be further substantiated with reference to disbursement records from Alalah, where Lauinger, through combined examination of textual and archaeological sources, identified a separate grain storage located outside the palace structure, on which dependents of the palace relied for their grain supply (Lauinger 2007, 276). Administrative records from the Eastern Lower Town Palace at Šehnā appears to be the result of a more complex process of saving managerial records for future reference (see e.g. Eidem 2008a, 283-285 for an insightful interpretation of the temporal distribution of the administrative texts).

6.3.2 Internal ordering and dating practices

Practices of storage offered some means of indexing, though exploited to various degrees. The administrative documents from Šušarrā derived from a single or two containers in which they were filed 'as they came in' (Eidem 1992, 14). Mallowan suggested a similar type of storage practice for the grain archive from Ašnakkum (Mallowan 1947, 82-83), while the batch of receipt and disbursement records belonging to the Qarni-Lim Palace brewery at Šehnā were found associated with four broken storage vessels (van de Mieroop 1994, 305). Multiple containers could be tagged with clay dockets giving a brief summary of the contents' subject matter, for example 'textiles of X', 'grain records of Y', or 'dead cows of Z', as evidenced at multiple sites in the Middle Euphrates Valley (At Mari e.g. Charpin 2001, also KTT 267, cf. Krebernik 2001, 112). Four dockets from Tuttul were used as labels, presumably for containers, giving month and year (KTT 125-128, cf. Krebernik 2001, 86). While the intriguing reconstruction of archive rooms, complete with shelves and utensils for preparing tablets, seen at mid-3rd millennium BCE Ebla is no doubt readily appreciable to the modern spectator, archival storage practices across palatial administrations in the Middle Bronze Age Jazīrah and beyond seem to have been more mundane (for succinct general comments, see Sasson 1972, 55-56).

6.4 Nutrition, diet, and allotment types

Before turning to my analyses of individual resource groups, I provide a brief review of nutrition standards and their relation to dietary regimes, followed by a few paragraphs on available data on age, gender, and allotment type. This discussion serves to establish a point of reference for discussing the nutritional value of grain disbursements, to be undertaken shortly, and more generally the value of subsistence goods issued by the institutional household. As seen in 2.4, human diet across the Middle Bronze Age Jazīrah and the Bilād al-Šām would have benefitted from a diverse range of plant and animal resources (for a comprehensive overview of diet in the alluvium, see Ellison 1981, 35-38, also Reynolds 2007, also Milano 1989). The human organism requires an intricate mix of nutrients to function, comprising carbohydrates, proteins, fibres, fats, and water, supplemented by a variety of minerals and vitamins. Apart from age and gender, energy requirements are dependent on several other principal factors:

- *Basal metabolism*, i.e. the energy requirements of functions essential for cell life and replacement, accounting for around 40-75% of daily total energy expenditure.
- *Metabolic response to food*, namely the energy required to ingest and digest food and to absorb, process, and deposit nutrients, accounting for a mean 10% of daily total energy expenditure.
- *Physical activity*, the second-largest element of daily energy expenditure, and naturally highly variable in terms of overall energy requirements.
- *Growth*, referring to the energy requirements of growing tissue and the energy deposited in tissue. While substantial during infancy, growth accounts

> for only 1-2% of total energy requirements from late infancy through adolescence, and becomes insignificant in the late teens (WHO & FAO 2004, 7).

Estimating nutritional requirements for past populations is a difficult undertaking, and generally scholars attempt to match available historical and archaeological information with modern benchmark standards. Modern nutritional standards are prescriptive values, and thus propose an *ideal* daily intake of calories, capable of preventing malnutrition, growth and reproduction deficiency (WHO & FAO 2004, 2). The table below (Table 6.15) compares these ranges with earlier estimates provided by FAO (1973, Passmore *et al.* 1974, Table 1). The latter set of values has been employed for historical studies e.g. by Gallant (1991, Table 4.5, see also Paulette 2013, 103-104), Ellison (1981, Table 2), and Padgham (2014, 19).

Gender	Weight (kg)	Age (y)	PAL	WHO 2004 (kcal/day)	Passmore et al. 1974 (kcal/day)
Infant	7-15	1-3	1.40	850-1200	820-1830
Child (female)	15-30	4-9	1.80	1500-2000	1830-2190
Child (male)	15-35	4-9	1.80	1650-2150	1830-2190
Adolescent (female)	30-65	10-18	1.95	2250-2800	2310-2490
Adolescent (male)	35-70	10-18	1.95	2450-3600	2600-3070
Adult (female)	65-85	18-29	2.05	2950-3600	2200*
Adult (male)	70-90	18-29	2.05	3600-4200	3000*

Table 6.15: Average daily energy requirements
(*age range 20-39 years, at 55 kg (female) and 65 kg (male)

The divergence between the two sets of nutritional needs is a result of the adjusted level of physical activity employed in my conversion of estimates from WHO, especially with respects to the energy requirements of adults. Whereas Ellison and Gallant assume a moderate physical activity level (PAL 1.75), I have sought here to move the range closer to the energy requirements calculated for non-mechanized agricultural work (PAL 2.25, cf. WHO & FAO 2004, 36, consider e.g. Soltysiak 2009, 136-138 for a study of skeletal stress as a result of physical activity at Middle Bronze Age Ašnakkum). While staple cultivars are able to satisfy a range of these nutritional requirements, meat is a primary source of various vitamins and fatty acids that cannot usually be replenished by plant foods, though legumes play an important role in this respect (Larsen 1999, 15). We may reasonably expect the average diet of an individual living in the Bronze Age Ancient Near East to have comprised 50-75% cereals, yet a diet consisting solely of cereals would cause serious malnutrition, and must remain a purely theoretical point of reference (Ellison 1981, 39, Paulette 2015, 47-48, for analyses suggesting a dietary average of 60-70% cereals in Greece, see Gallant 1991, 62-75, for an asserted 50-60% cereal diet in Syria, see Deckers and Riehl 2008, 176).

6.4.1 Gender

Males and females have different energy requirements, and should as such be distinguished when assessing the nutritional value of grain rations relative to overall dietary patterns. Administrative documents generally note gender of the recipient, but mainly through the exclusive use of the female determinative marker 𒊩 (Sum. munus, Akk. *šinništu*), rather than the consistent application of a male and female marker in combination. The personnel inventory ATaB 40.01 from Alalah, which identifies females with the masculine marker 𒁹 (Sum. diš) followed by the female determinative 𒊩 (Sum. munus) is a rare exception (see for Late Bronze Age attestations of this phenomenon Brinkman 2007, Abrahami 2011). By inference, we assume then that male gender is the case when no marker is used, a notion that appears supported by circumstantial information, e.g. summaries in grain disbursement records, which allow us to count and cross-check the number of female recipients and non-gender (i.e. male) recipients. This method can hardly be deemed satisfactory, however, and I limit conclusions on gender distribution to fairly isolated groups of documentation for the same reasons (for a recent approach to the study of gender within a coherent dataset, see Tenney 2011, 47-57).

6.4.2 Age

Age qualification is generally tripartite in nature, and distinguishes between adult (gender only), adolescent (Sum. tur), and infants (Sum. tur-gaba) (Leick 2015, 83-85). A further category is used to designate 'old' individuals (Sum. šu-gi4), but this label finds only haphazard application in the current dataset and will not be further discussed here (note that it is also used in reference to elders, with rather different social implications). Though age in years can be roughly approximated according to the above terminology, allotment sizes, when correlating for various social factors such as status and profession, can provide more precise indication of the age range of a given individual (Pollock 2003, 27-33 with further references). For individual analyses, it should be noted that, as with gender, the practice of excluding or simplifying markers of gender may equally apply to those of age, so that the wide range of ration sizes attested e.g. for adult women in the dataset may be due to lack of proper age identification on the part of the scribe. The estimated age range for specific groups given here (Table 6.16) generally follows those offered by Waetzoldt on the basis of ration size (Waetzoldt 1987a, 133).

Gender	Sumerian	Age (y)
Infant	tur-gaba	1-4
Adolescent (female)	munus-tur	4-15
Adolescent (male)	tur	4-15
Adult (female)	munus	>15
Adult (male)	lu2 (or not given)	>15

Table 6.16: Age and gender divisions in administrative records

6.4.3 Types of allotment

An array of different terms for rations or allotments are employed in administrative sources pertaining to institutional households. Generically, I prefer to employ the term ‘allotment’ to emphasise the highly variable nature of the different types of rations observed in the documentation, as ‘ration’ seems to me to devote too little import to the fact that maintenance allotted from institutional households rarely appears to satisfy the full range of human needs (Stol 2008, Prentice 2010, 94, Sallaberger and Pruß 2015, 79-81). Allotment categories offer some important additional information on the social nature of the disbursement in question and, equally importantly, the degree of permanence that we can assign to it. The total dataset contains close to 4,000 individual attestations of given allotment types. The site-by-site distribution of this number, is, however, heavily skewed due to archival composition (Table 6.17). Detail Data Types followed by the site code in superscript indicates that the type is only attested in texts from this specific site.

Data Type	Detail Data Type	Description
Allotment (Reference)	Allotment (UNCLASSIFIED)	Damaged or not given.
	Grain ration (Akk. *ipru*)(ALA)	Cereal subsistence allotment for individuals, predominantly monthly issue.
	Grain ration (Sum. še-ba)	
	Oil ration (Sum. i3-ba)(SZE)	Oil allotment, very rare in this dataset (but cf. Gelb, 1965).
	Allowance (Sum. sa2-sag)	Cereal, food, or drink allotment, predominantly daily issue.
	Allowance (Sum. sa2-dug4)	
	Meal (Akk. *naptanu*)	Food or drink allotment, predominantly a daily and singular issue. Much used for visitors, messengers, etc.
	Meal (Sum. nig2-gub)	
	King's meal (Sum. nig2-gub lugal)	
	Allocation (Sum. kurum6)	Food or drink allotment, predominantly a daily and singular issue.
	Allotment (Akk. *naplastu*)(TUT)	Unclear (cf. Krebernik, 2001:94)
	Drink (Akk. *šatû*)(SZE)	Issue of drink, related to *maštītu*.
	Drinking allowance (Akk. *maštītu*)(ASZ)	Drink allotment, especially for beer.
	Provision (Akk. *magarrû*)	Travel provisions, usually issued for individuals for one to three days.
	Provision (Akk. *ṣidītu*)(TUT)	
	Fodder (Akk. *zaraphu*)(ALA)	Fodder for animals of all kinds. Predominantly monthly issues with daily rate given.
	Fodder (Sum. ša3-gal)	
	Damaged	Entry damaged.
	Unknown	Not available.

Table 6.17: Data Type: Allotment (Reference) Detail Data Types

The above paragraphs provide some illustration of age and gender divisions that can be traced in the dataset, along with an overview of disbursement terminology. The remainder of the present chapter proceeds to discuss individual resource groups appearing in the dataset, focusing on processes of acquisition, manipulation and consumption and on the scale and extent of the given resource infrastructure within the institutional household organisation. I begin with grain, followed by derived products such as flour, bread, and beer, then oils, fats, sweeteners, and wine. A general discussion of this entire infrastructural complex and, in particular, implications for our understanding of dietary regimes, is reserved for the end of this chapter.

6.5 Grain

I have shown that cereals account for c. 95% of all preserved amounts in the dataset (5.2.8). While in need of some additional qualification, it is beyond dispute that cereals constituted the key resource within the Bronze Age economy as a whole (Paulette 2015, 8-14). The role of cereals within agricultural regimes is discussed in the next chapter (7.2.1), while the overall scale of grain production and consumption is reserved for Chapter 9, as this particular resource type constitutes the main proxy by which to compare organisational scale with a wider social base. Here, I focus on the practice of distributing cereals, and in particular the size of individual allotments appearing in the corpus. As cereals constituted the larger share of the Bronze Age diet, I also offer calculations on the nutritional value of grain allotments contained in the dataset. This discussion is further expanded upon in the concluding section of this chapter.

We will assume that grain accounted for in disbursement records was threshed and winnowed upon harvesting, but not subjected to any further processing, e.g. through grinding or milling (e.g. Rattenborg 2016). If so, there is no clear or unequivocal mentioning of this in the dataset and grain given out as rations (Sum. še-ba) is generally never qualified in any particular way. In ATaB 41.04, two entries in a section on the disbursement of emmer (Sum. ziz$_2$), among other things for grain rations, read "102 (*pārisu*) for grinding, 50 (*pārisu*) for grinding on grinding stones" (ATaB 41.04 r.09-10). Workers at Šušarrā received emmer for crushing (Akk. *hašālu*), in a section also issuing emmer for seed (Sum. numun) (Sh II 7). The latter, by ethnographic comparison, further suggests the grains in question to be in spikelet form, as sowing seed is usually stored in this way (Hillman 1984, 128). In both cases, verbal forms and contextual information clearly indicates cereals in need of grinding, and likely, pounding, suggesting stored grain still husked (also suggested by Paulette 2015, 45, see for corresponding views on Egypt Samuel 1993, 278, Murray 2000, 527).

6.5.1 Grain consumption

Several authors have commented on benchmark allotment sizes in administrative cuneiform records, and their general agreement with modern nutritional standards (e.g Gelb 1965, Ellison 1981, 40-43, Zeeb 2001, 208-209). Divergent results will arise, however, from calculations based on unique ration sizes compared to the distribution of attested ration sizes within a given dataset. Ellison's important study (Ellison 1981) on nutrition and ration allotments establishes averages based on unique values, but these numbers do not allow us to consider more closely the average distribution of given ration sizes. Or, simply stated, attested ration sizes will tell us what people *could* receive, rather than what they, on average, *did* receive (also Paulette 2013, 103). Samples illustrative of this point are available from several of the study sites, and may, when drawing on research into the absolute value of the Bronze Age measures used, form a good basis for understanding the nutritional value of grain issued by the institutional household. First, let us consider grain disbursements encompassed by ASZ Sample 1, an analytical group of seven disbursement records from Ašnakkum also discussed later (9.1.2).

		l/month			**kcal/day**		
Age and gender	**Count**	**min**	**max.**	**mean**	**min.**	**max.**	**mean**
Child	3	0	0	**0**	0	0	**0**
Adolescent (female)	35	12	48	**25.03**	800	3200	**1669**
Adolescent (male)	59	12	72	**29.36**	800	4800	**1957**
Adult (female)	284	12	72	**40.86**	800	4800	**2724**
Adult (male)	167	24	78	**49.37**	1600	5200	**3291**

Table 6.18: Allotment sizes for 548 individuals at Ašnakkum (*qa*/litre ratio of 1.2)

This group of texts covers allotments of grain for 555 unique individuals, encompassing residents and servants of the palace, the workshops, livestock herders, weavers and fullers, and other units (see also 14.4.2). Excluding outliers above 108 litres per person per month from the distribution given in the present chart (Figure 6.13), we can calculate average daily nutritional value for various gender and age groups as found in the table below (Table 6.18).

From Qaṭṭarā, a sample from a more nucleated palatial context is available (QAT Series 1), though it gives no evidence on managerial segments outside the palace. As the two exemplars are largely similar accounts from two different months, the associated table (Table 6.19) gives figures for one text, OBTR 208, and again excludes outliers (>108 litres). Assuming a conversion rate similar to the one found at Ašnakkum (abiding by the interpretation given by Powell 1990, 501), average allotments are in neat agreement (Figure 6.14), which should be expected given that the sample encompasses a comparable transect of professional designations, namely palatial servants, grinders, weavers, and fullers.

		l/month			kcal/day		
Age and gender	**Count**	**min**	**max.**	**mean**	**min**	**max**	**mean**
Child	n/a	-	-	**-**	-	-	**-**
Adolescent (female)	n/a	-	-	**-**	-	-	**-**
Adolescent (male)	6	18	36	**24**	1200	2400	**1600**
Adult (female)	34	24	48	**36.35**	1600	3200	**2423**
Adult (male)	10	36	60	**49.2**	2400	4000	**3280**

Table 6.19: Allotment sizes for 50 individuals at Qaṭṭarā accounted for in OBTR 208 (*qa*/litre ratio of 1:1.2)

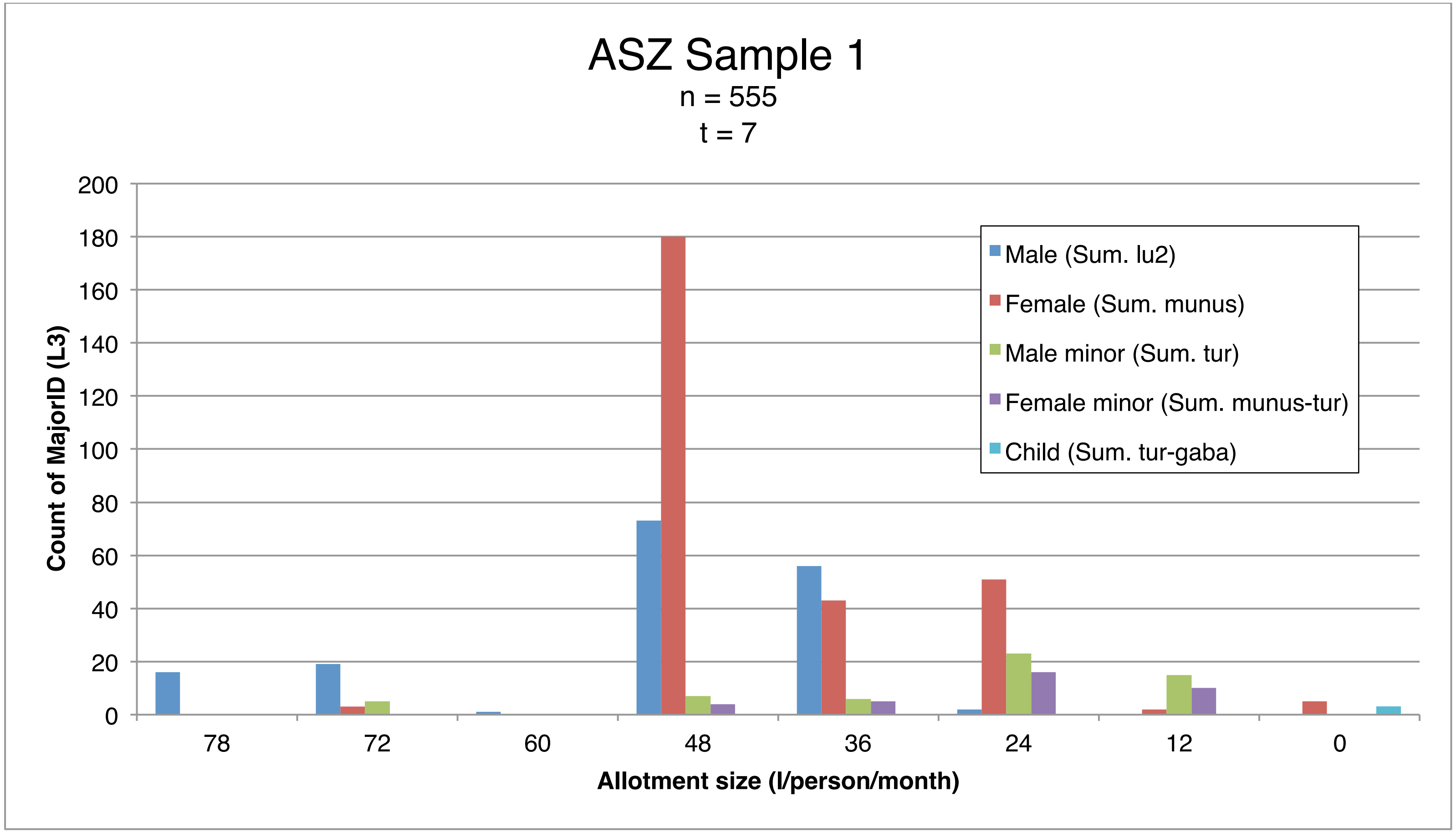


Figure 6.13: ASZ Sample 1: Count of grain allotment sizes by gender and age (*qa*/litre ratio of 1:1.2)

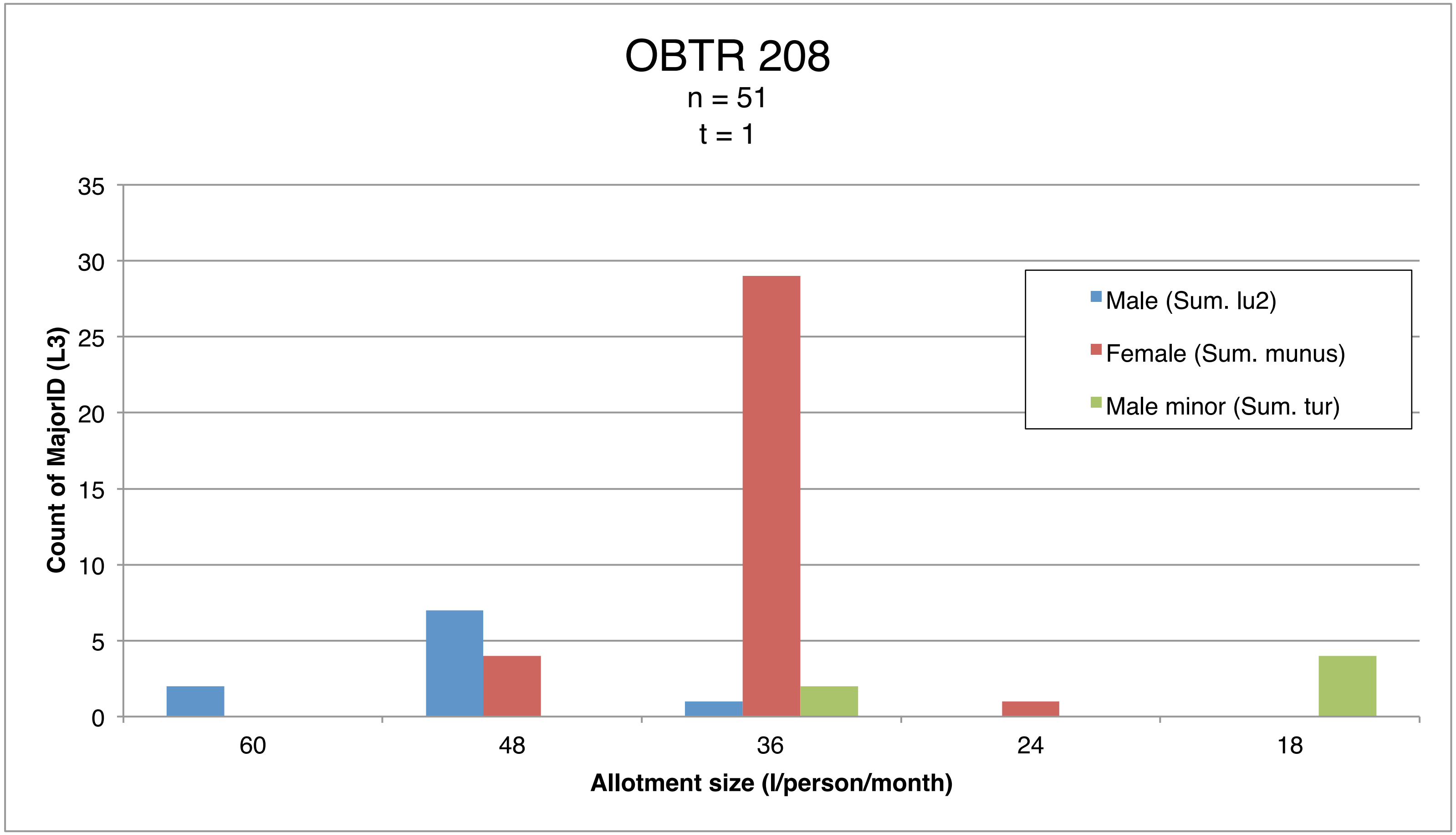


Figure 6.14: QAT Series 1: Count of grain allotment sizes by gender and age (*qa*/litre ratio of 1:1.2)

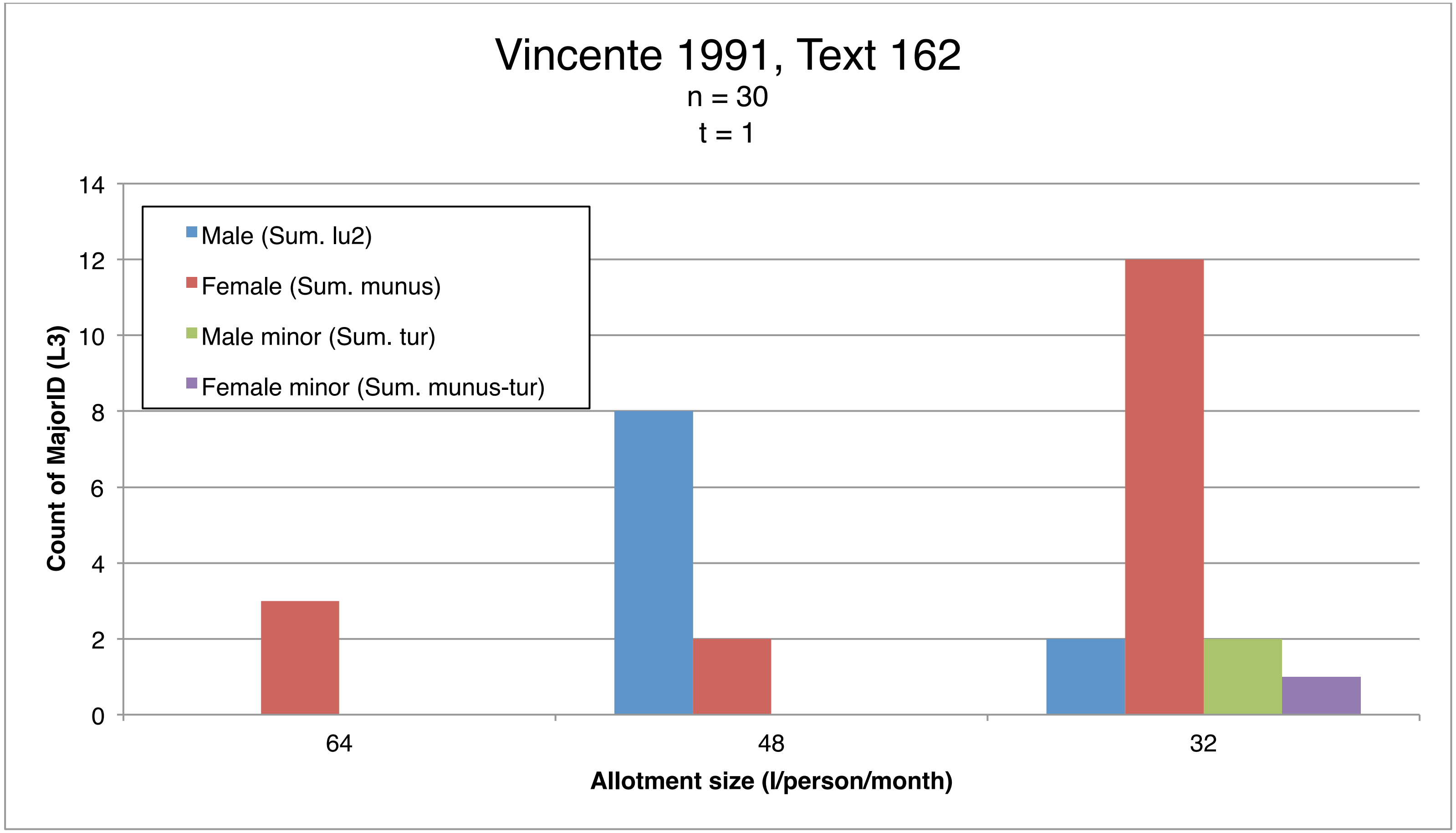


Figure 6.15: Vincente 1991, Text 162: Count of grain allotment sizes by gender and age (*qa*/litre ratio of 1:1.6

		l/month			kcal/day		
Age and gender	**Count**	**min**	**max.**	**mean**	**min**	**max**	**mean**
Child	n/a	-	-	**-**	-	-	**-**
Adolescent (female)	1	32	32	**32**	2133	2133	**2133**
Adolescent (male)	2	32	32	**32**	2133	2133	**2133**
Adult (female)	17	32	64	**39.53**	2133	4267	**2635**
Adult (male)	10	32	48	**44.8**	2133	3200	**2987**

Table 6.20: Allotment sizes for 30 individuals at Šehnā (*qa*/l ratio of 1:1.6)

Lastly, I include a grain disbursement record from Šehnā (Vincente 1991, Text 162), which, though accounting for a relatively modest amount of people presumably all residing in the palatial structure, matches the examples already presented well, if assuming one *qa* to equal 1.6 litres here (Figure 6. 15 and Table 6.20, see also Appendix 2). Expanding upon the initial discussion of grain subsistence needs (4.2.1.3), the above examples suggest a good level of consistency, when accepting the conversion rates given here, in the size of grain allotments issued by the institutional household to its dependents (Figure 6.16). For Ašnakkum, it also provides a good illustration of exactly how many people were in regular receipt of grain allotments. Based on average values calculated for each of the three cases just presented, we can suggest the annual rate of consumption for an adult female to have been c. 300 kg of cereals, and that of an adult male c. 375 kg of cereals. I discuss the wider implications of these figures in the concluding section of this chapter. The derived figures further form an important part of our discussion of organisational scale in Chapter 9. Now, let us consider resource types derived from the processing of raw cereals.

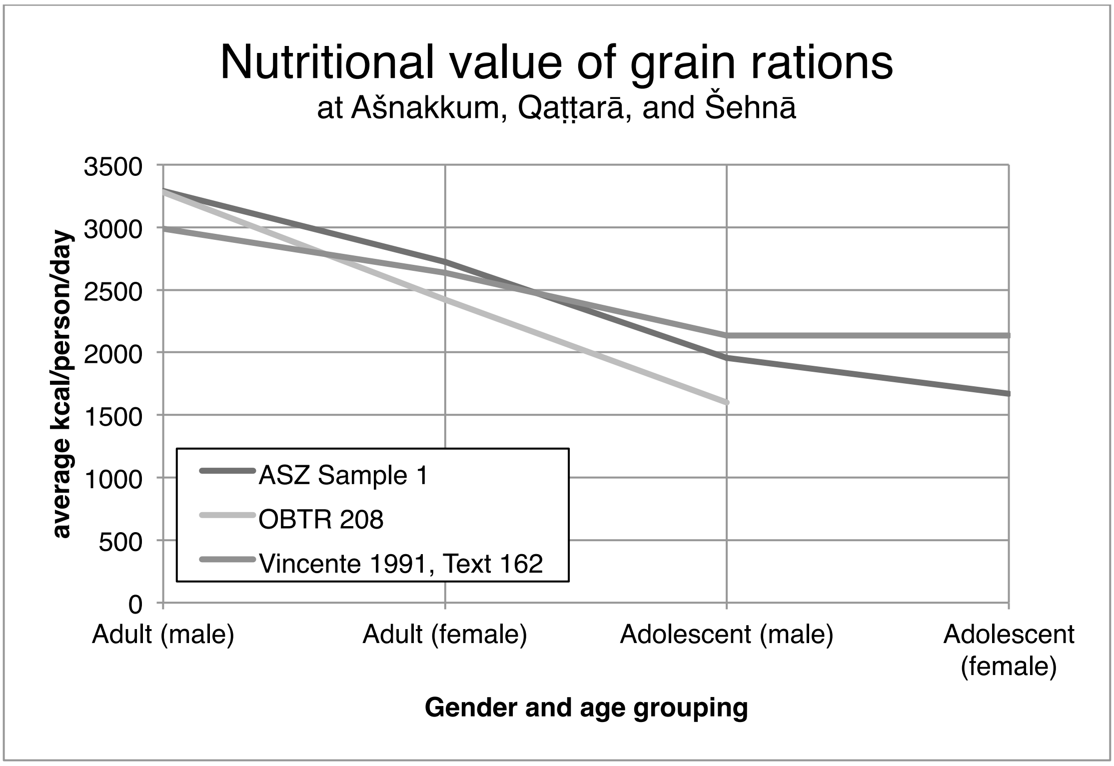


Figure 6.16: Comparison of average nutritional value of grain allotments from ASZ Sample 1, OBTR 208, and Vincente 1991, Text 162.

6.6 Groats, flour, and bread

Cereals form the basis for a wide range of staple foods, all involving various modes of cleaning, grinding and sifting the grain. Whole and crushed grains (groats) can be consumed in soups and porridges, or used as an additive in many types of cooking. Ground grain yields flour, the fundamental basis for making bread and cakes. A variety of these products appear across the dataset, albeit in much more modest amounts than unprocessed cereals. Given thorough drying and adequate storage, dry and well protected from rodents, unprocessed grain may remain edible for several years. Breaking the grain, as is done through crushing and grinding, exposes the fatty acids of the grain germ and initiates oxidisation that will render the flour rancid within months (Kaufman 2006, xli). The further processing of cereals, therefore, was likely aimed at relatively immediate consumption. In the following section, I review first the processing of cereals through pounding, grinding and milling, and secondly the nature of the derived products, notably groats, flour, and bread as these appear in the dataset and the cuneiform record more broadly.

6.6.1 Parching, pounding, grinding, and milling

I discuss the harvesting, threshing, winnowing and transporting of grain from the fields in the next chapter (7.5). Here I consider processing of stored grain within the settled community, and the management and consumption of derived products. We have seen that grain kept in storage within the settlement was threshed and winnowed, but unlikely to have been processed any further. Threshed grain requires several further stages of processing before it can be consumed by humans (for a useful overview of these processes in cuneiform sources, see Postgate 1984b, also the ethnographic study by Hillman 1984, for an example from Egypt, see Samuel 2000, 541 and Fig. 522.543). After threshing, barley grains retain their hull casing, and emmer grains remain in spikelet form. Free-threshing wheat, as implied by the name, is the only cereal type of relevance here that produces naked grains as a result of threshing (Charles 1984, 24 for a schematic illustration). Barley and emmer can be pounded to remove the glume or husk from the naked grain. Pounding is commonly undertaken with the use of pestle and mortar throughout most non-industrialised agricultural communities of the world, (Hillman 1984, 130, also Samuel 2000, 560). The mortar may be produced from stone or a plastered hollow in a floor. The pestle is predominantly made of wood, and so generally absent from the archaeological record (wooden pestles have been recovered from Late Bronze Age Amarna, see Samuel 1993, 280 and Fig. 285).

There is little unequivocal reference to the process of pounding cereals in cuneiform sources, which may be due to a conflation of the terms for pounding (Akk. *hašālu*) and grinding (Akk. *ṭēnu* or *samādu*). Postgate suggests the former to refer to the pounding of threshed grain to remove the glume or husk (as with the example from Šušarrā, cf. Sh II Text 7), while the latter (predominantly *ṭēnu* in our dataset) refers to the milling of naked grains on grinding stones (Postgate 1984b, 107). The grinding or milling of cereals was carried out with the use of saddle querns in the Bronze Age, a time-consuming and labour-expensive means of processing compared to the rotary quern, which was only invented in the late 1st millennium BCE (Lucas 2006, 11-18 with further references). Grinding stones could be produced from several different types of stone, preferably hard enough to avoid stone grit in the finished product. Granite examples are known from Egypt (Samuel 1993), while the cuneiform record gives plenty of references to grinding stones made from *atbaru*, the Akkadian word for basalt (Stol 1979, 83-86). Exhaustive treatments of grinding stones in the archaeological record of Bronze Age and historical periods more generally are few (Ellis 1993, 401), the more so because utensils such as mortars and quern stones demonstrate negligible degrees of evolution from the Neolithic till present day (Karimali 2005, 203).

Subsequent sieving of the cereal meal is very much dependent on the intended end product (consider the wide range of sieving processes of raw and semi-processed wheat described by Hillman 1984, 128-135, also Samuel 1993, 281-282). Grinding rates are then the most important variable to consider here, as it offers some means of appreciating the divide between foodstuffs made from whole cereal grains and those made from flour. Explicit references on such ratios are rare, and we often have to rely on inferences from less unambiguous sources (e.g. Brunke 2011a, 89-93). An interesting document is a short grain disbursement record listing three donkey-loads of grain issued for grinding (Akk. *ṭēnu*), as an 'assignment for three men for 10 days' (OBTR 187 v.04-05). This translates into a daily grinding ratio of 1 *sūtu* per man per day (Milano 1993b, 398). Similar numbers have been presented for the Third Dynasty of Ur (Englund 1991, 270-273). If accepting a measure of roughly 1 *qa*/litre, these tally neatly with experimental examples from an Egyptian context (Samuel 2009, 473, further discussed by Padgham 2014, 43-44). The reasons for the variation in daily rate and associated ratio of unprocessed grain to flour presented in the table below (Table 6.21) is not evident from the sources, but sieving and refining of the meal is likely to blame for the observed discrepancy (consider here Samuel 2009).

Type	**Flour (*qa*/day)**	**Grain/flour ratio**	**Grain (*qa*/day)**
nig$_2$-ar$_3$-ra	20	3:2	30
zid$_2$-eša	20	2:1	40
zid$_2$-še	10	1:1	10
zid$_2$-sag	10	2:1	20
zid$_2$-gu	8	2:1	16

Table 6.21: Daily flour production rates per worker (after Englund 1991, 270-273)

6.6.2 Groats

Groats are the hulled kernels of cereal grains, or cereals processed through crushing, bruising or pounding at any stage between complete grain and flour

(Postgate 1984b, 106). These can be utilised in cooking in various ways, chiefly as a nutritious element in soups or porridges. The most amply attested type of groats (Sum. nig$_2$-ar$_3$-ra, Akk. *mundu*) is thought to refer to a processed form of emmer (Milano 1993a, 25), an association not conclusively affirmed by the present dataset. Groats are found recorded in a variety of contexts, for meals, for brewing, and occasionally in allotments. A related product is Akkadian *arsānu*, (Sum. ar-za-na), by contrasting with the former usually understood as 'barley groats'. Sum. nig$_2$-ar$_3$-ra appears in considerably larger quantities than Akk. *arsānu* at sites where wheat crops are otherwise poorly attested, however (7.2.1). Though barley flour (Sum. zid$_2$-še) is qualified as a type of flour rather than as groats, the coarse nature of this product should be noted, not to mention its prominence in the cuneiform record. Coarse barley flour is, by far, the most amply attested flour type in the administrative record of the Third Dynasty of Ur (Englund 1991, 270), and equally so in the present dataset (Table 6.22).

Data Type	Detail Data Type	Description
Commodity (Reference)	Groats (Sum. nig2-ar3-ra)	Hulled or cracked cereal kernels
	Barley-groats (Sum. ar-za-na)(TUT)	Hulled or cracked cereal kernels, supposedly from barley (see discussion above)
	Barley-groats (Akk. *arzānu*)(ASZ)	

Table 6.22: Detail Data Types for groats

6.6.3 Flour

Flour produced from grinding and milling comes in a wide variety of forms, depending on fineness and composition. Attestations of flour in our dataset are relatively sparse, probably indicating that grinding and milling of grains were costly undertakings, and flour therefore rarely issued in a processed state. The table given here (Table 6.23) summarises unique types of flour contained in the dataset , and while a few are likely redundant, they give a good impression of the range of flours appearing in the administrative record. Unqualified flour is attested as Sum. zid$_2$ (generally not given with Akkadian *qēmu*). Common types refer to the cereal in question, e.g. coarse barley flour or grits (Sum. zid$_2$-še or dabin, Akk. *tappinnu*), and, at Šušarrā only, emmer flour (Sum. zid$_2$-ziz$_2$) and flour from free-threshing wheat (Sum. zid$_2$-gig). Other varieties were more finely milled, and correspondingly of higher value. 'Rare' flour (Sum. zid$_2$ sag) constitutes more finely processed versions of the common barley flour, while *saskû*-flour (Sum. zid$_2$-eša) is regularly seen used in offerings. ‘Powdered’ barley flour (Sum. zid$_2$ gu, Akk. *qēmu sīku*) is apparently a very fine type of grain, as is *isqüqu*-flour (Sum. zid$_2$-kum). The latter is often seen in royal meals (Milano 1993a, 26).

Data Type	Detail Data Type	Description
Commodity (Reference)	Barley flour (Sum. zid2-še)	Based on our knowledge of barley flour probably very coarse flour types. Barley flour is very common, and issued for a wide range of recipients.
	Emmer flour (Sum. zid2-ziz2)[SZU]	
	Wheat flour (Sum. zid2-gig)[SZU]	
	Flour (Sum. zid2)	Generic designations for flour. Given the relatively small amounts, the qualifier *sammidātu* (‘milled’) may designate a finer variety (cf. Milano 1993a, 28).
	Flour (Sum. zid2-da)[ALA]	
	Flour (Sum. zid2 *sammidātu*)[ASZ]	
	Flour (Akk. *maṣhatu*)[TUT]	Unknown type (cf. Milano, 1993:28).
	Flour (Akk. *huhanu*)[ASZ]	Unknown type (cf. Talon, 1997:38)
	Rare flour (Sum. zid2-sag)	Rare flour, a finer variety than the coarse flours above. A relatively common sight in allotments.
	Flour (Akk. *sasqu*)[ASZ]	A good quality type of flour, often seen in royal meals and in offerings.
	Flour (Sum. zid2-eša)[ASZ]	
	Fine flour (Sum. zid2-kum)	Finely ground flour varieties, often appearing in royal meals and in offerings.
	Powdered flour (Sum. zid-gu)	

Table 6.23: Detail Data Types for flour

By far, the basic and coarse varieties, notably barley flour or grits (Sum. zid$_2$-še), but likely also emmer (Sum. zid$_2$-ziz$_2$) and wheat flour (Sum. zid$_2$-gig) appear in the largest amounts, followed by generic designations (Sum. zid$_2$). The higher value of finer varieties is underscored by the much more modest amounts of these types disbursed at any one time. These observations agree with Milano’s assertion that flour, when consumed by the average dependent of institutional households, was produced from grain allotments issued rather than received as a finished product (Milano 1993a, 30-31).

6.6.4 Bread

Bronze Age bread relates to two basic types, namely leavened and un-leavened bread. The latter is made from the mixing of flour with water and salt, and usually baked to a thin and crusty wafer. The former involves the use of yeast, either atmospheric or derived from sour, the fermentation of which causes the dough to rise and provides for a more spongy and elastic product (Ellison 1978, 119-123). Unleavened bread is a rather mobile traditional staple food in the Middle East and can be baked in the embers of open fires and on hot stones (see observations by Layard and Musil in Ellison 1978, 119, also Bottéro 2004, 47-49). Leavened bread requires additional preparation and time to allow for the dough to rise, and is commonly baked in ovens, in the Middle East notably the domed *tannūr* (for a survey of historical and ethnographical examples, see Ellison 1978, 121-123). Late Bronze Age domestic houses at Tall Bazi on the Middle Euphrates habitually include domed ovens for small-scale bread-making, while larger ovens, necessary especially for more complex types of dishes, appear in palatial complexes (Otto 2012, 180-181 and 185-186). Designated bakers (Sum. du$_8$, Akk. *epû)* appear as a common element of the institutional workforce. In receipt of monthly rations, we find two men at Ašnakkum (OBTCB 12, 81, 82, and 88), and, in a fragmentary context, three women at Tuttul (KTT 288). A baker with the palace at Alalah figures as the conveyor of substantial issues of emmer wheat and cumin (ATaB 41.12, 16, 46, and 54). Bread comes in numerous forms, shapes, and compositions. Coarse as well as finely textured types are known from Egypt, and demonstrate a range of culinary preferences rather than functional necessity (Samuel 2000, 563-565, for a recent discussion of bread in an Early Bronze Age context from the alluvium, see Brunke 2011a, 95-158, for Neo-Assyrian perspectives, see Gaspa 2011). Cooking areas in Zimri-Lim's palace at Mari have yielded a fine collection of pottery moulds demonstrating a wide range of patterns and forms that could be applied in the making of breads, cake, and pastry dishes (Reynolds 2007, 176-177, also Margueron 2004). Much of the culinary vocabulary in cuneiform sources derives from elite and very highly specialised contexts (Reynolds 2007, 174-176). Specific designations of bread in the current dataset are relatively limited, however (Table 6.24).

Data Type	Detail Type Data	Description
Commodity (Reference)	Barley bread (Sum. ninda-še)	Assuming a relationship with barley flour probably a coarse and very common type of bread, and the only type appearing in large amounts.
	Emmer bread (Sum. ninda-ziz2)[SZU]	
	Bread (Sum. ninda)[TUT]	Generic. Most likely barley bread.
	Ordinary bread (Sum. ninda-us2)	With reference to flour types probably a finer variety. Note the correspondence with beer qualifications (see below).
	Rare bread (Sum. ninda-sag)	
	Bread (Akk. ninda *mersu*)[SZE]	A type of pastry also containing various vegetables, e.g. onions and leeks.
	Sour bread (Akk. ninda *emṣu*)	
	Fine bread (Sum. ninda-kum)	Finely textured bread types. Generally appear in modest amounts.
	Fine bread (Sum. ninda-gu)	

Table 6.24: Detail Data Types for bread

The bread types attested here reflect attested types of flour given earlier, namely through varieties such as bread made from ‘powdered’ flour (Sum. ninda-gu) and fine flour (Sum. ninda-kum). More generic terms such as barley (Sum. ninda-še) or emmer bread (Sum. ninda-ziz$_2$) are then likely of a coarser texture and made from the less finely ground varieties of flour mentioned earlier. The latter type is the more commonly seen variety in the present dataset. Providing specific estimates of the size, composition, and nutritional value of bread must remain a very speculative exercise, however. Though bread is measured in capacity volumes from around the mid-3rd millennium BCE onwards, any attempt at establishing equivalencies between the amount of ingredients and end product runs up against regional and local variation and tradition. Brunke’s discussion of bread types from the Third Dynasty of Ur offers critical information on the amounts of bread that could be produced from a given amount of flour and gives a range predominantly within the ratio of one measure of flour to one and a half or two measures of finished bread (Brunke 2011a, 98-116).

6.6.5 Flour and bread in disbursements

Having reviewed the basic properties of cereal processing and cooking, let us consider how these relate to the textual assemblages considered here. Despite the relatively modest sample of domestic architecture available in the archaeological record, it seems safe to conclude that the average Bronze Age household held a hearth and, most likely, an oven (cf. discussion in Pollock 2012, 156-158, but consider observations on Tall Bazi in Otto 2012, 180-181). As such, we would expect the majority of people in receipt of grain from the institutional household to have processed and consumed cereals at home (Milano 1993a, 30-31). Available observations relate to a much more constricted selection of recipients when compared to those in receipt of grain. In contrast to the latter, groats, flour, and bread (and also beer, to be discussed later) generally do not appear in consistent accounting series, e.g. in records that would indicate a certain group of recipients to be in permanent receipt of processed cereal products in the same manner as many others were in receipt of grain.

In our present dataset, we can discuss the disbursement of flour and bread with reference to three broad categories; general allotment accounts, that is disbursements of flour or bread to an extensive group of people, issues of meals or provisions to individual messengers and travellers, and issues to royal meals or banquets. One of the few consistent series available is TUT Series 1, accounting for issues to a recurring group of individuals, up to a maximum of 40 persons, perhaps part of the managerial stratum of the governor's household (Figure 6.17). In total, these concern issues of flour in the range of 200 to just more than 700 *qa* for each text. Individual amounts of flour issued fall in the range of 1-2 *sūtu* per person, suggesting monthly disbursements.

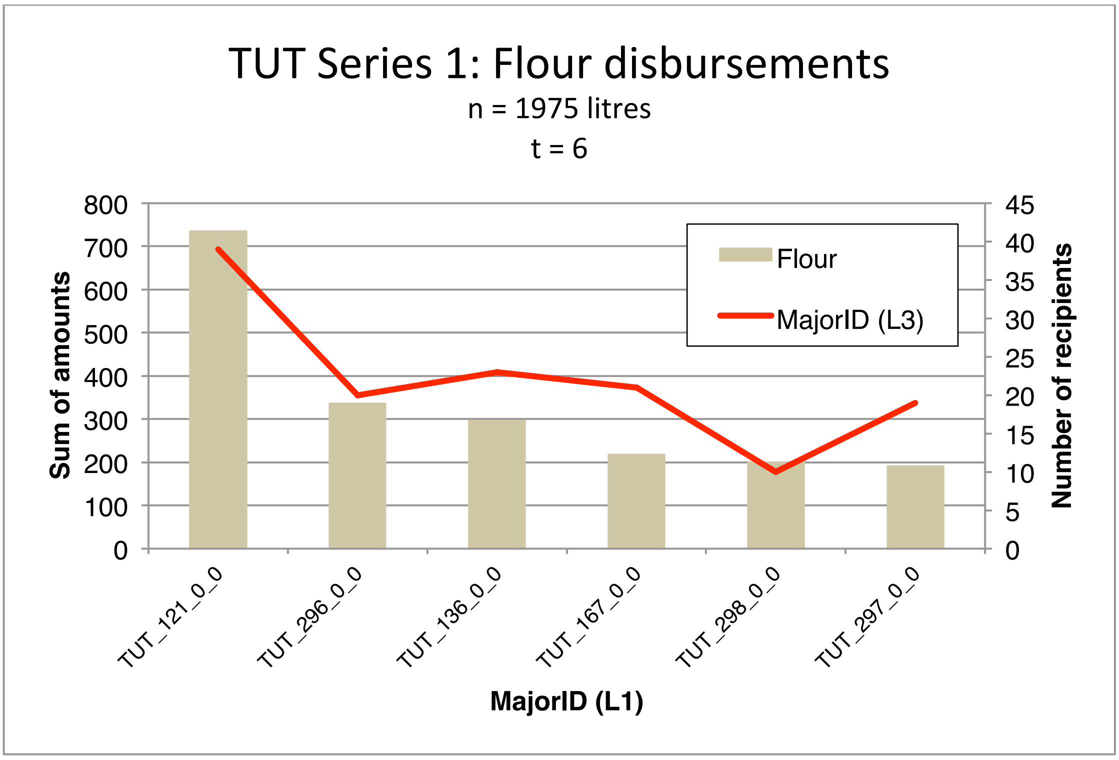


Figure 6.17: TUT Series 1: Sum of amounts of flour disbursed by text (columns) with count of recipients (line) (*qa*/litre ratio of 1:1)

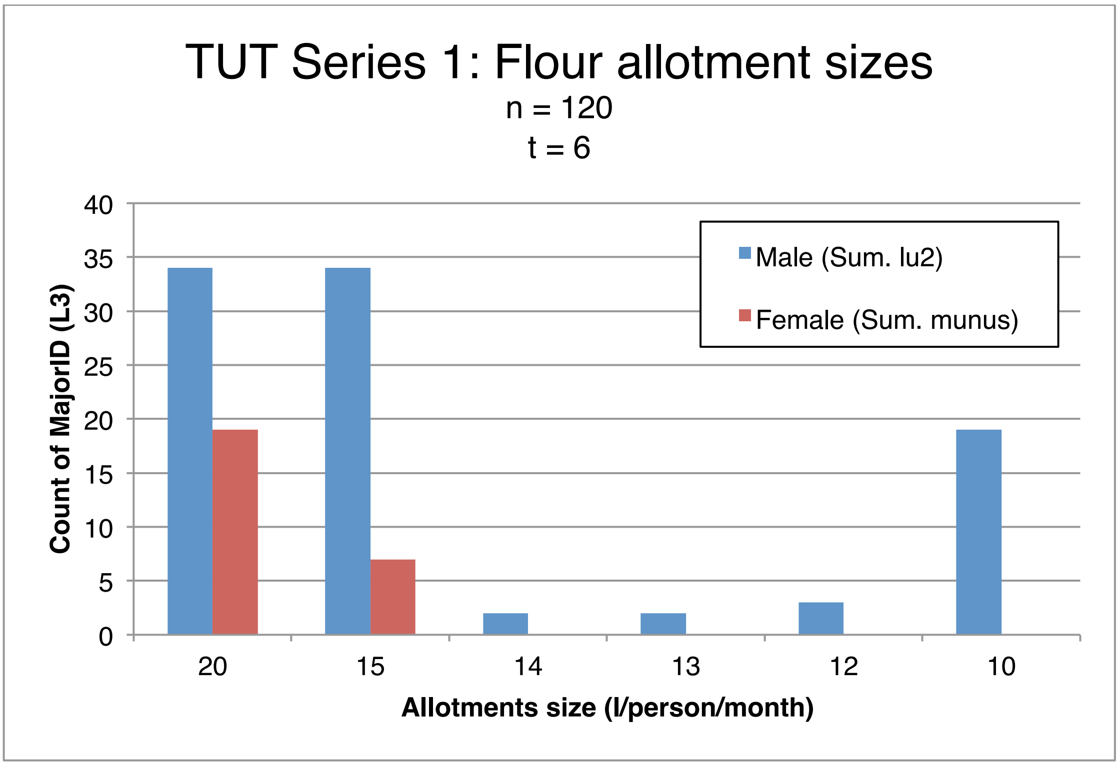


Figure 6.18: TUT Series 1: Count of flour allotment sizes by gender (*qa*/litre ratio of 1:1)

A daily flour ration in the range of 1/3-2/3 *qa* based on TUT Series 1 (Figure 6.18) is further substantiated by individual entries concerned with flour and bread in disbursements for travellers and messengers contained in TUT Dossier 1 (Figure 6.19). Flour is regularly issued at a rate of one *sūtu* per person, bread at one to five *qa*. Some of these, namely in the range of one to three *qa* of bread, approach the daily subsistence level. An issue of one *sūtu* of flour, in contrast, is roughly equivalent to some ten litres and evidently exceeds a day's meal. The lowest amounts of flour given to individual messengers passing Tuttul are one *qa* of barley flour (Sum. zid$_2$-še) (e.g. in KTT 99), which agrees with an average one *qa* of grain per person per day. Minimum bread allotments appear to be in equal agreement with this figure, e.g. one *qa* per person (e.g. KTT 92), though they are often higher. Meals for 2,770 troops passing Ašnakkum during the census (OBTCB 19) give one *qa* of grain for bread and half a *qa* of grain for ordinary beer, which, given ratios presented earlier, would equal one and a half to two *qa* of bread and two *qa* of beer for each man.

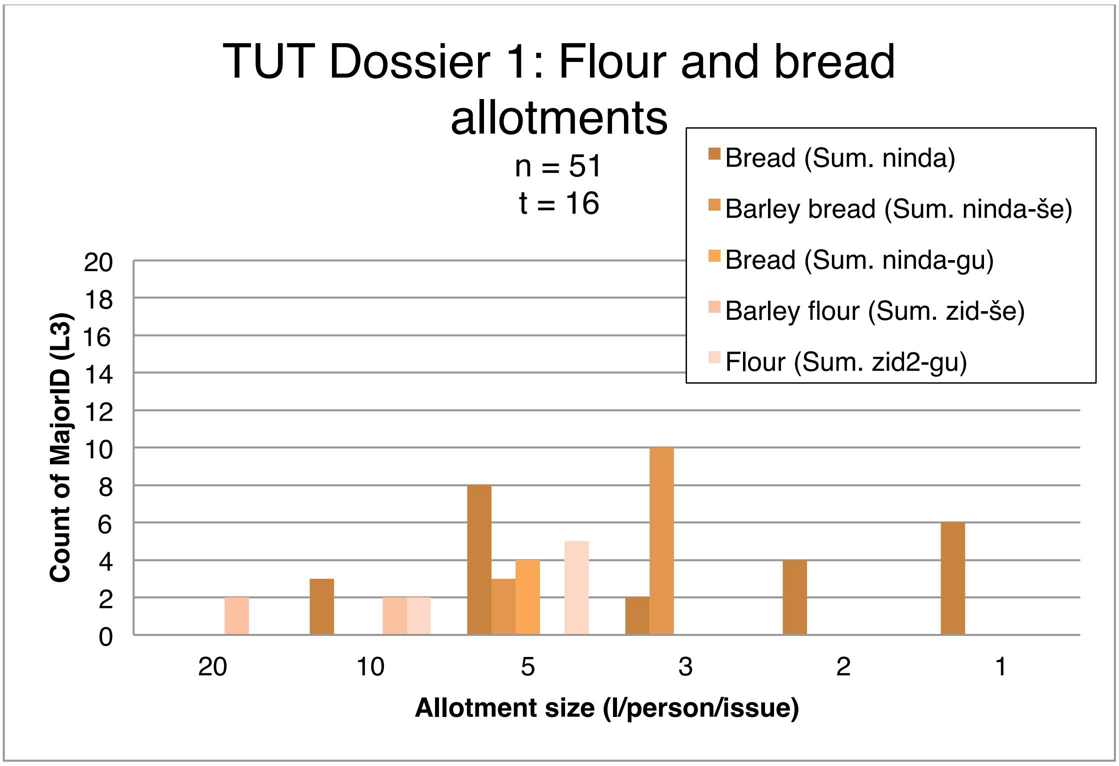


Figure 6.19: TUT Dossier 1: Count of bread and flour allotment sizes by resource type (*qa*/litre ratio of 1:1)

6.6.6 Milling capacity

To compare disbursed amounts of processed cereal products to the estimated production capacity of the institutional household organisation, let us return to the contingent of grinders associated with the Ašnakkum palace. Drawing on daily production ratios offered above (6.6.3) we can make some simple calculations to illustrate the potential amount of flour that would be available for consumption at any one time. In accordance with the relevant entries in OBTCB 80, we assume that 17 female grinders (Akk. *ṭēnu*) were occupied in the Ašnakkum palace throughout the year. To this, we can add another group of grinders listed in the first section of the workshop ration records (OBTCB 12, 81, 82, and 88) and counting between 16 and 20 men and one woman. We assume an average of 19 grinders here. With the estimated grinding rates given above, and further assuming a 60% barley flour, 30% rare flour, and 10% fine flour distribution (similar proportions are employed in Padgham 2014, 43, note also the 85% of total annual flour production made up of coarse barley flour in the previously mentioned study by Englund 1991, 270), we can calculate the amounts produced per month and per year for the institutional household as a whole (Table 6.25).

Type	Palace (17 grinders)		Workshop (19 grinders)		Total	
	***qa*/ Month**	***qa*/ Year**	***qa*/ Month**	***qa*/ Year**	***qa*/ Month**	***qa*/ Year**
Barley flour (Sum. zid$_2$-še)	3,060	36,720	3,420	41,040	6,480	77,760
Rare flour (Sum. zid$_2$-sag)	1,530	18,360	1,710	20,520	3,240	38,880
Fine flour (Sum. zid$_2$-gu)	408	4,896	456	5,472	864	10,368

Table 6.25: Estimated rates of flour production per month and per year for Ašnakkum institutional household (drawing on Englund 1991, 270)

The grand total of grain that could be milled within a year at Ašnakkum lands then at just over 127,000 *qa* (with a resultant 102,384 *qa* of flour, when following the above percentages). This estimate ignores several subtracting factors. First, grinders, as most other parts of the workforce engaged within the institutional household economy, could and were called upon to perform other duties than those specified in the allotment records, especially in relation to harvest and construction (as amply demonstrated in Englund 1991). Second, we are not accounting for days off (which were, in any case, irregular), nor particular social events, e.g. festivals, rituals, or gatherings. Based on a modest daily intake of one *qa* of flour, an annual production rate of 100,000 *qa* of flour translates into daily maintenance for some 250 people. If factoring in further singular expenses, such as those summarised above, the number would presumably drop to less than 200. External sources of income should be considered. From the Zagros, we have a few references to receipts of prepared groats and flour supplied by village communities. At Šušarrā, Sh II 48 was made out to account for wheat flour received from workers (Sum. aga-uš) and from a local village. Sh II 16, correspondingly, accounts for arrears owed by two named individuals, namely amounts of wheat flour, groats, and raw cereals.

6.7 Beer

Beer (Sum. kaš, Akk. *šikāru*) was widely consumed throughout the Bronze Age, and has been extensively discussed in the literature (principal works are Hrozný 1913, Hartman and Oppenheim 1950, Civil 1964, Röllig 1970, Stol 1971, 1989, 1994, Powell 1994, Damerow 2011). The importance of beer in pre-modern diet is due to a range of factors, notably a high content of carbohydrates, proteins, and B-vitamins, which provided for a nutritious food supplement. Simple forms of beer with low alcohol content (0.5-2%) can be produced by soaking grains, heating the mixture for 24 hours, followed by fermenting for another 24 hours (Hornsey 2003, 8). Intentional malting and use of fermenters, such as starter cultures may allow for a higher alcohol percentage (2-4%) and a beverage with a nutritional value not easily matched by anything but animal products (Katz and Voight 1986, 27). In general, the various modes of processing may take anything between three days for brewing and fermenting to three weeks if one includes the time needed for malting grain, with a finished product shelf life of no more than a week (Jennings *et al.* 2005, 286, Dietler and Herbich 2006, 401, Crewe and Hill 2012, 210). It was only with the much later addition of hops, which brings a couple of powerful natural preservatives, that beer could be stored for prolonged periods of time (Cantrell 1999, 619).

6.7.1 Brewing practices

Our knowledge on the individual stages of beer brewing in the Bronze Age Tigris-Euphrates drainage is patchy and relies extensively on literary compositions (Damerow 2011, 15-17). Brewing involved a few basic steps. The first was the preparation of malt through germination of dried cereal grains. Grains require initial drying before steeping and malting, as seed dormancy will otherwise prevent germination (Zarnkow *et al.* 2006, 19-21). To produce malt, the grain was first steeped in water to heighten moisture content that would allow the grain to sprout. Following soaking, the grain was drained, spread out, and regularly stirred on an open surface to provide aeration while the grains germinated over a period of one to three weeks. The germination process, which initiates the conversion of starch into maltose, was subsequently halted in order to prevent the developing plant from using the converted sugars. At this stage, the germinated grain is referred to as 'green malt'. Powell notes that the germination of barley in this manner requires an even temperature of ca. 15°C, which would seem to preclude malting of grain in most parts of the Middle East during the hot summer months (Powell 1994, 95). Practical tests conducted in the Middle Euphrates Valley have, however, demonstrated excellent germination conditions in mud-brick housing with a stable room temperature of 24°C during high summer (Zarnkow *et al.* 2006, 18-19). The receipt of grain and the disbursement of beer in accounts from the Jazīrah generally do not demonstrate any seasonal variation in terms of activity, and so support the latter point.

The germination of grain was halted by raising storage temperature. Kilns for the drying of sprouted malt have been tentatively identified in the alluvial south and in the Mediterranean (Gibson 1972, Crawford 1981, Crewe and Hill 2012). In a Middle Eastern context, open-air drying on roofs produces the same effect at least at spring or summer temperatures of 45-60°C (Zarnkow *et al.* 2006, 19-20). The regular reference to deliveries of grain or malt obtained from a threshing floor (Akk. *maškānu*) at the Qarni-Lim Palace at Šehna throughout the year to brewing facilities that contained a number of ovens may illustrate both of these steps of drying (more generally also Crewe and Hill 2012, 209). Proportions of malt in beer recipes from the Early Bronze Age alluvium suggests that malt, if actually dried in kilns, was only exposed to a relatively low temperature in order to preserve active enzymes (Powell 1994, 95). The resulting product is commonly termed 'cured malt' in a European context, but there is no clear distinction between the two forms of malt in cuneiform sources considered here (invariably referred to as Sum. $munu_4$, and not with the Akkadian equivalent *buqlu*).

Cured malt, in contrast to green malt, can be stored for prolonged periods of time. This allows for a practical and temporal separation between malting and brewing. To prepare cured malt for brewing, the germinated and dried seeds are crushed to more fully expose the kernel, whereupon the malt could be mixed with water. A couple of products derived from processed malt evidently play a role alongside cured malt at this stage (Damerow 2011, 15-16, also Stol 1989, 324-325, Powell 1994, 99-101). Early Bronze Age administrative documents from the alluvial south relate combinations of especially 'malt cake' (Sum. titab, Akk. *titāpu*), and 'beer dough' (Sum. bappir, Akk. *bappiru*) with malt, and the former two seem to be processed derivatives of malt, adding flavour or colouring to the finished beer through roasting and mixing with plants and syrup. Beer dough is commonly assumed to be the main fermentation agent involved in beer production (by way of relation with leavened bread), but understanding the term as a flavoured by-product of malt seems to agree better with the sources (Stol 1989, 325-326, Hornsey 2003, 84, Damerow 2011, 15). Fermentation either through naturally occurring bacteria or the constant re-use of fermenting vessels is also a viable possibility (Cantrell 1999, 620). Analysis of Late Bronze Age Egyptian beer residues indicate lactic acid bacteria to have been a likely fermentation agent (Samuel 2000, 547-548). Van de Mieroop noted the absence of the beer dough, or indeed any known fermentation agent in a substantial number of accounts on raw materials issued for a brewery at Šehnā (van de Mieroop 1994, 314-315), and the substance is virtually absent from records across all six sites considered here. The two extant references relate to grain issued for the manufacture of Akk. *bappiru*, but in neither case do we find any obvious link to the brewing of beer[1]. Considering the relatively substantial number of texts concerned with beer production and consumption, this seems less a coincidence than a reflection of actual accounting or brewing practices (see also the critical discussion of bread dough as an element of Egyptian brewing practices in Samuel 2000, 555).

To obtain a basic sugar-rich liquid suitable for fermentation, the crushed malt was mixed with water to produce a mash, initiating the enzymatic conversion of starch into sugars. To make this process efficient, mash is normally heated, ideally to a temperature of around 50-60°C, and kept at this temperature for at least an hour. There is no pertinent information on how the practicalities of heating the mash in order to control this process were overcome. By spreading the mash on reed-mats, the liquid wort (Sum. dida) could be filtered out and poured into containers for fermentation. Arguments for a cold mashing process utilisable in hot climates have been made through the study of brewing utensils from Tall Bazi (Zarnkow *et al.* 2006, Zarnkow *et al.* 2011). Some of the practical steps in brewing are more readily visible in the archaeological record than others. The initial stages of soaking, germinating, and air-drying grain could have been undertaken in a variety of

[1] ATaB 41.13 and Sh II 52 (ALA_222_5_2 and SZU_52_5_3 respectively). The entries are somewhat similar in context; in ATaB 41.13 the reference to barley for beer loaf (Akk. *bappiru*) (v.16) 40 *a-na* bappir *ba$_2$-ap-pi$_2$-ri* is associated with issues of fodder (Sum. ša$_3$-gal) and seed (Akk. *šukuptu*), while Sh II 52 lists barley for malt (Sum. munu4), seed (Sum. numun) and for beer loaf (Akk. *bappiru*) (r.08) 80 še *a-na ba-ap-pi$_2$-ri*.

locations not easily detected. The making of beer mash involves a rather characteristic material component, namely the mash-tun or beer vat, which contains a bottom perforation to allow for the extraction of beer wort from the container. Abundant references to mash-tuns (Sum. gakkul, Akk. *kakkullu* or *namzītu*) can be found in cuneiform sources, notably also in literary compositions, and testifies to the symbolic importance attributed to the artefact and its use. The rim of an early 2nd millennium BCE mash-tun was found at Faīlakhā, carrying an inscription that read "1 mash-tun (Akk. *kakkullum*) of Jatara, son of Gurd[a]"[2], suggesting that mash-tuns were both long-lived and personal artefacts, (Pulhan 2000, 153).

6.7.2 Brewers and breweries

Although brewing could also be undertaken at a household level (Zarnkow *et al.* 2006, 2011), we will concern ourselves here with large-scale brewing aimed at supplying extended households. The most coherent assemblage of textual and material remains relating to large-scale beer production stems from the Qarni-Lim Palace at Šehnā (van de Mieroop 1994, Pulhan 2000). The beer disbursement records from Ašnakkum are remarkably similar in format and information contents, yet their archaeological context offers no substantial traces of features relating to beer production. As noted above, we should expect the material remains of brewing to relate to three distinct parts of the brewing process. First, soaking, malting, and drying of cereals could have been undertaken with access to ceramic containers for steeping the grain, a spacious area with a level temperature for germination, and open-air spaces for drying. Second, the pounding and grinding of cured malt and roasting of derived products would require mortars, querns, and ovens for heating. Third, mixing of malt and other ingredients with water in mash-tuns, optimally with artificial heating to sustain a temperature of 45-60°C, and vessels to facilitate subsequent cooling and storing of the wort to begin fermentation.

The assemblage from the Qarni-Lim Palace at Šehnā displays most, yet not all of these elements. The excavated transect of the complex exposed a spacious courtyard some 10x10 metres in extent well suited for the drying of germinated cereals, with remains of several ovens that could have been used for kilning or roasting. A number of rooms opened onto this courtyard, of which Room 12 to its east contained a number of saddle querns and an in situ stone mortar, likely used for pounding and grinding of cured malt (Pulhan 2000, 159). The same room

[2] 881.XR (1) 1 *ka*$_3$-*ku-ul*-[*lu*]-*u*[*m*] (2) ^{m}PI-*ta-ra*-[x] (3) dumu *gu-ur-d*[*a*]

contained the remains of the brewer's administrative records, namely a total of 80 receipts for raw materials and 447 records of beer disbursements (van de Mieroop 1994). Pulhan has further argued for the identification of an oval-bodied jar well represented in the ceramic assemblage with a standardised measure of beer regularly appearing in the disbursement records (Pulhan 2000, 122-123). While facilities for the preparation of dry ingredients for brewing are then well documented, there is little trace of mashing, fermenting, or storage. A dedicated brewery excavated at 15th century BCE Azu (Tall Hadidi) in the Middle Euphrates Valley demonstrates similar spatial organisation, yet with a substantial selection of large ceramic vessels, notably storage jars with perforations and a volume capacity ranging from 75 and up to 350 litres (Gates 1988, 168). Palace breweries were overseen by brewers (Sum. lu$_2$-lunga, Akk. *sīrāšû*) and the individuals accountable for the receipt of raw materials occasionally appear as such in the administrative record, e.g. Samkānu, the brewer of Iltani's household at Qaṭṭarā (OBTR 173 and 176). At the Qarni-Lim Palace at Šehna, a single individual named Mutu-ramê accounted for virtually all receipts of grain and all issues of finished products (van de Mieroop 1994, 310). Multiple agents are involved in brewing at the palace of Ašnakkum (see Lacambre 2008a, 193-203).

6.7.3 Types of beer

A variety of beers are found within the assemblages surveyed here (Table 6.26), and while a good deal of caution should be maintained when assessing the relative importance of individual types, given potential particularity of local practices and the incomplete nature of the sources, some generic patterns can be suggested. For the Jazīrah, namely for Tuttul, Ašnakkum, Šehnā and Qaṭṭarā, attestations of beer relate to either of four main types; kaš *ša ṣumišu*[3], kaš sig$_5$ ('rare beer'), or kaš us$_2$ ('ordinary beer') (see e.g. Lacambre 2008a, 184-193). Another variety, kaš *ṭābu* ('sweet beer') appears only at Qaṭṭarā, and may be a local variety. The so-called mixed beer (Sum. kaš u$_2$-sa, Akk. *billatu*) is, in ortographic terms, identical to wort (Sum. dida), and therefore most likely constitutes unfermented beverage. This type occurs less frequently in disbursement records.

[3] The meaning of the term is uncertain. The proposed reading of *ša ṣumišu* as 'of his thirst' seems the only one currently viable.

Data Type	Detail Data Type	Description
Commodity (Reference)	Beer (Sum. kaš)	Generic.
	Thin beer (Akk. kaš *gurnu*)	Inferior quality beer when ranked together with other types (cf. Lacambre 2008, 185). Ratio not known.
	Ordinary beer (Sum. kaš us2)	Average beer, often issued in bulk amounts for meals.
	Rare beer (Sum. kaš sig5)	The most extensively attested beer type in daily allotments within the dataset.
	Beer (Akk. *miz'u*)[ALA]	Unknown type. An issue of emmer is given *ana mizzi* in ATaB 41.35 v.22.
	Grape beer (Sum. kaš geštin)[ALA]	Unknown type. Only attested in ATaB 41.71, where it is qualified as 'sour' (Akk. *emṣu*). Could be wine rather than beer (cf. Zeeb 2001, 199;also Sasson 1994, 400).
	Mixed beer (Sum. kaš-u2-sa)	Beer fortified with additives, or beer wort. Quite rare in this dataset.
	Sweet beer (Sum. kaš *ṭābu*)[QAT]	Issued in equal amounts with rare beer at Qaṭṭarā.
	Fine beer (Sum. kaš *ša sumīšu*)	The best quality beer found in the present dataset. Occasionally qualified with Akk. *birû*.

Table 6.26: Detail Data Types for beer

The former three are distinguishable through the ratio of grain they contained, as gleaned from a group of grain disbursement records that gives proportion of grain, presumably barley, required for the production of these varieties (Gadd 1940, 29-30, with concise discussion in Ellison 1978, 142-144, also Lacambre 2008a, 184-186). Rare beer (Sum. kaš sig$_5$) is by far the most common type found in disbursement records here. Beer classified *ša sumišu* consistently appears in smaller amounts, while ordinary beer (Sum. kaš us$_2$) is attested mainly in issues to more extensive, and often less prominent, groups of people. Whereas the resident members of palatial households at Ašnakkum, Šehnā, and Qaṭṭarā received rare beer, the occasional issues to various groups of personnel is mostly ordinary beer, e.g. issues of bread and beer grain for accountants and servants at the former site (OBTCB 36 & 37). The attested ranges from Ašnakkum mirror brewing ratios from the alluvium, namely from Powell's immaculate analysis of administrative records from pre-Sargonic Girsu (Tall Tīllūh) (ca. 2400 BCE) (Powell 1994), and Charpin's discussion of a disbursement record from Old Babylonian Ur (Tall al-Muqayyar) (Charpin 1986, 307-310). Although variation in flavour and composition may differ, the same basic range of variation appears, namely 0.5 ~ 2 measures of grain to beer, which suggests a good deal of resilience in brewing practices throughout the Early and Middle Bronze Ages (Figure 6.20).

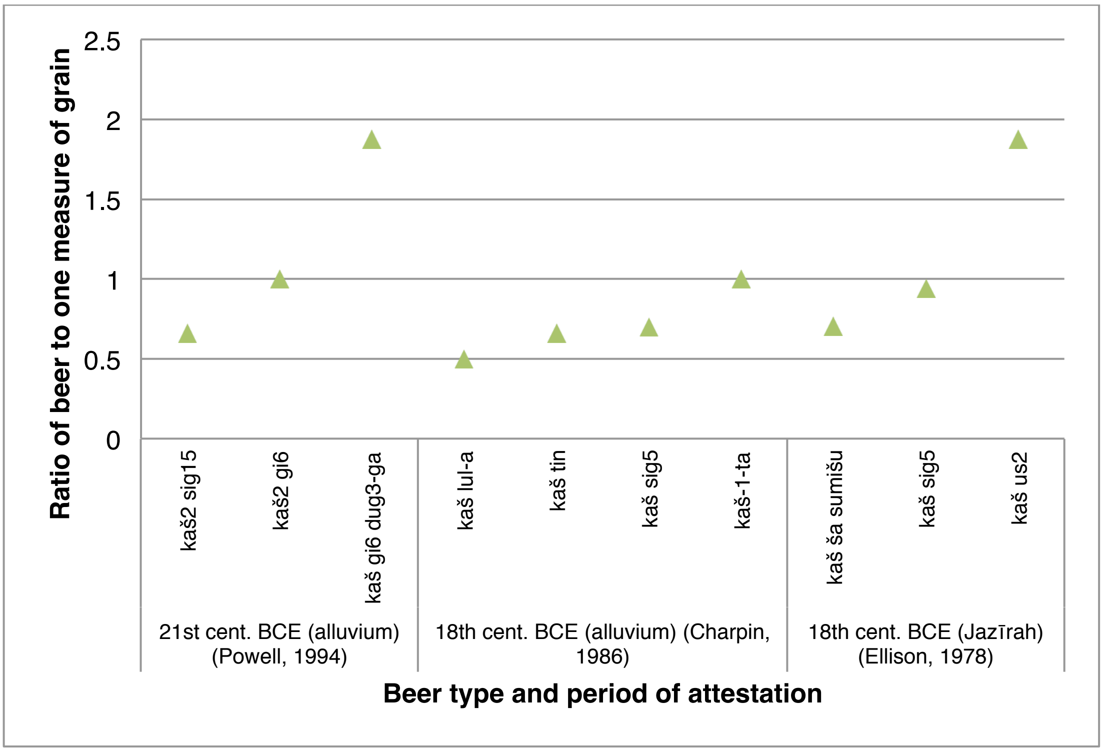


Figure 6.20: Comparison of grain to beer ratios from studies of Middle Bronze Age textual records in the Jazīrah and the Iraqi alluvium

6.7.4 Beer production

Analytical groups from the dataset allow us to discuss the average annual level of beer production within the institutional household, namely at Ašnakkum, Šehnā, and Qaṭṭarā. The relevant series relate to raw products issued for brewing, i.e. grain and malt products. Three texts (OBTR 176-178, QAT Series 2) from the archives of Iltani at Qaṭṭarā are clearance accounts from the palace grain storage, and cover issues of grain for brewing over three quarters of the year of Ṣabrum (REL 218). We will consider these here together with OBTR 179, a related note accounting for arrears. OBTR 176-178 and 179 together forms QAT Dossier 2 (Figure 6.21).

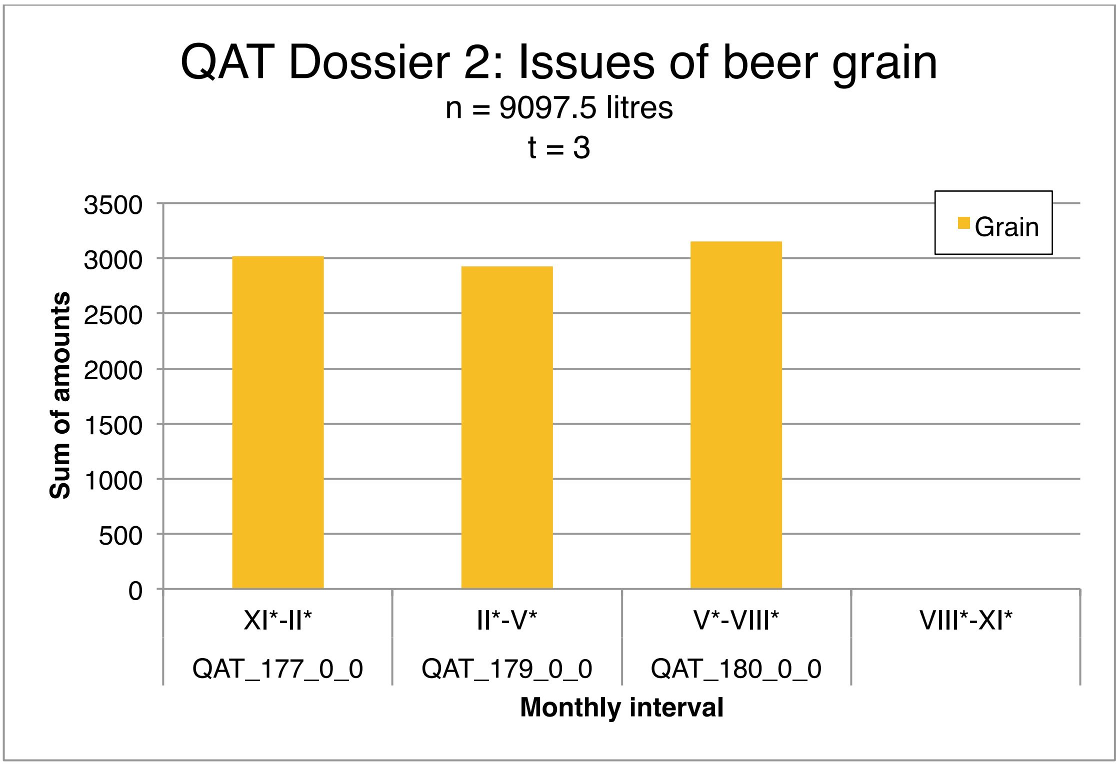


Figure 6.21: QAT Series 2: Sum of beer grain disbursements by text and monthly interval (*qa*/litre ratio of 1:1)

The aggregate amount issued over a period of nine months is 9,097.5 litres, if assuming a generic conversion rate of one *qa* to one litre. With the arrears of 450 *qa* accounted for in OBTR 179, we arrive at a total of 9,547.5 litres. With a mean average of 3,182.5 litres beer grain per quarter, we can suggest a monthly rate of around 1,060 litres and an annual total of 12,720 litres. A similar collection of disbursement records comes from the Qarni-Lim Palace at Šehnā. All derive from Room 12 of the palace structure and likely constitute accounts of raw products delivered to the brewer there. Of a total 80, the preliminary edition offers information on 61 texts (SZE Dossier 1) that are dated along with notes on the amounts accounted for. The dossier covers resources received over a period of 21 months from the year of Aššur-taklāku (REL 206) to the year of Ahu-waqar (REL 208). A few of the texts account for relatively small amounts of malt products (e.g. Sum. titab and sun$_2$, and Akk. *agarinnu*) and rare and mixed beer (Sum. kaš sig$_5$ and us$_2$-sa sig$_5$). The vast majority concerns malt or malt grain (Sum. munu$_4$ or še-munu$_4$) and grain (Sum. še), with a lot of some 4,000 litres that cannot be qualified, though they should likely be assigned to one of the two former types (Figure 6.22).

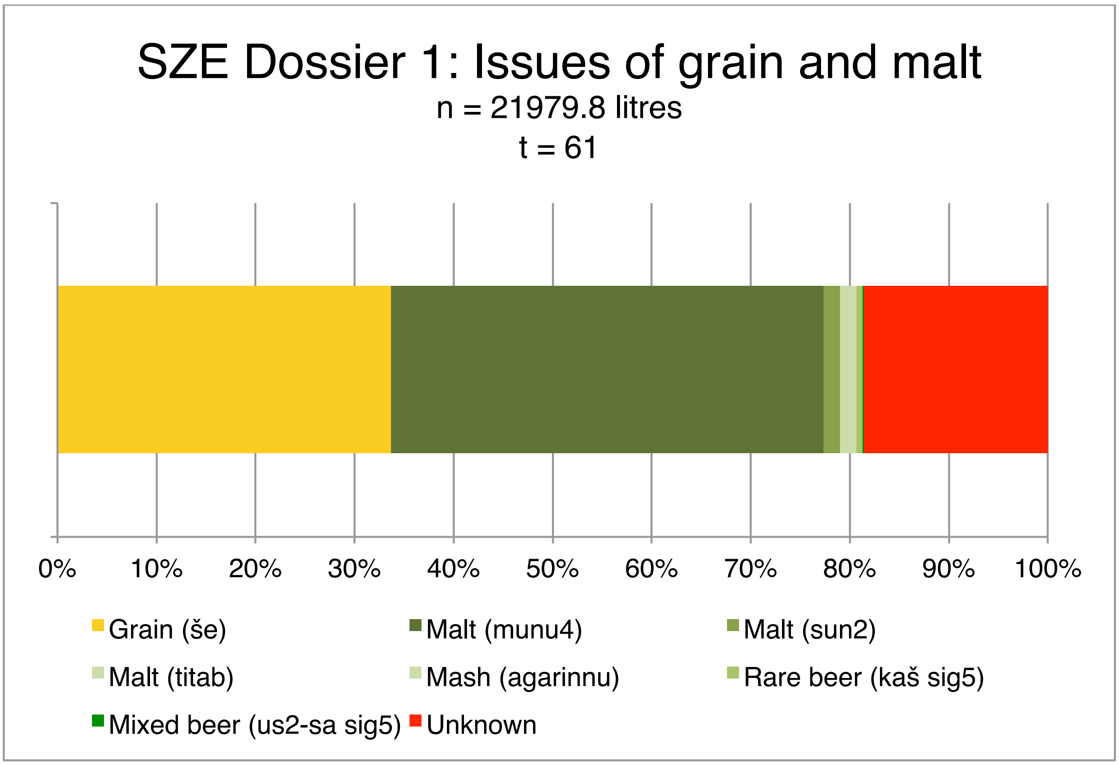


Figure 6.22: SZE Dossier 1: Proportions of resources contained in SZE Dossier 1 (*qa*/litre ratio of 1:1.2)

The chart on the next page (Figure 6.23) excludes amounts of derived products and beer, and concentrates on the amount of grain and malt issued to the household brewer. I have left out three texts dating to the early months of the eponym of Ahu-waqar (REL 208), as the type of resource listed in these records has not been preserved. We can then compare these numbers to amounts given in a single compound account (L91-206) covering issues of beer grain for the same brewer over a period of nine months from the year of Aššur-taklāku (REL 206) to the year of Sassapum (REL 207). Excluding amounts of grain received for rations, L91-206 provides a total 10,869 *qa*, landing us at an average 1207.67 *qa* per month. As will be clear, this agrees poorly with the chart supplied for SZE Dossier 1, and may suggest that the latter accounts for beer malt (Sum. $munu_4$) for brewing and grain (Sum. še) for rations or food production respectively. A better fit is then obtained when comparing issues listed in L91-206 only to issues of malt (Sum. $munu_4$) given in SZE Dossier 1 (Figure 6.24).

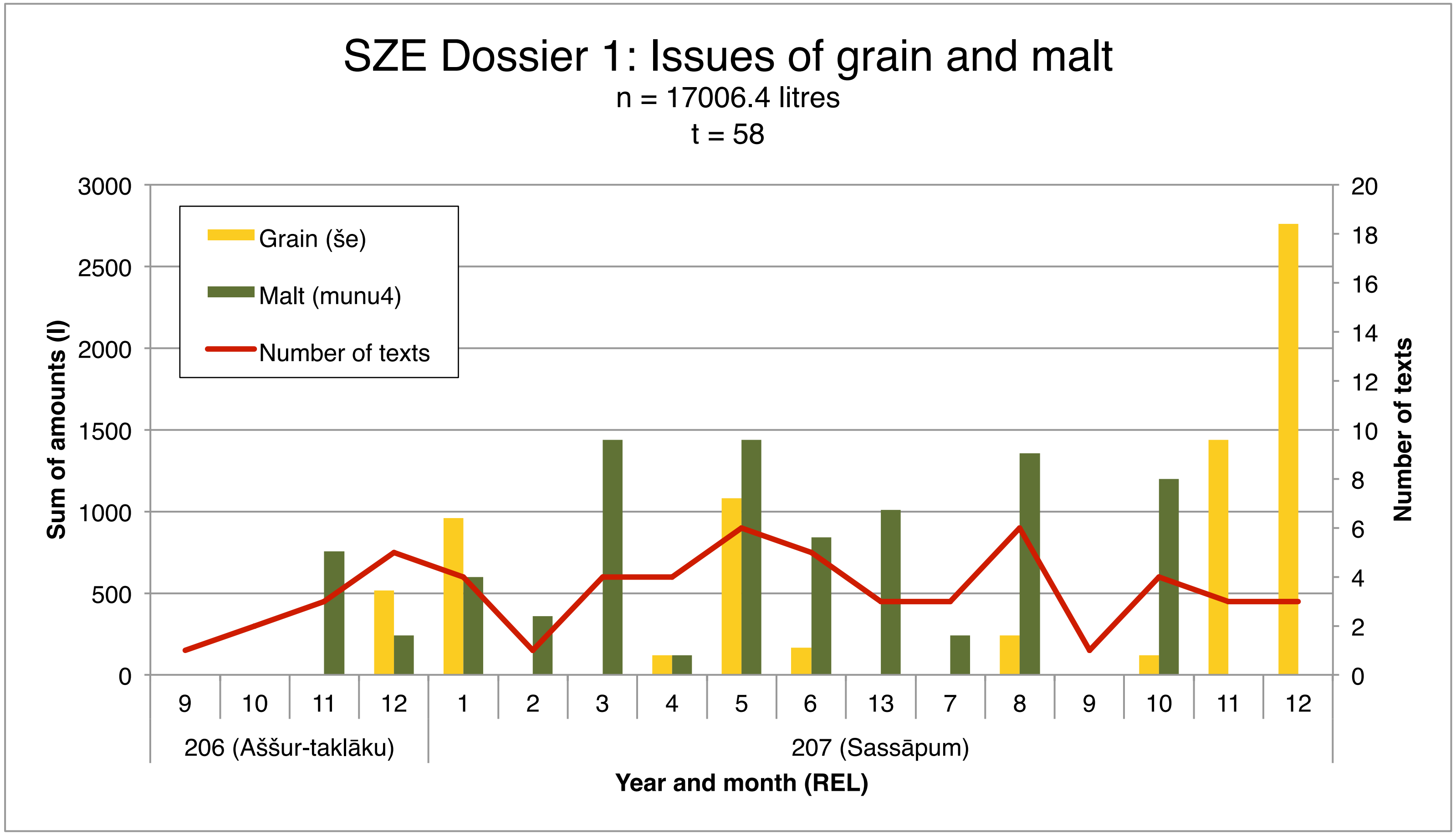


Figure 6.23: SZE Dossier 1: Sum of amounts in grain and malt disbursements over 15 months (columns) distributed according to month and year with number of texts per month (line) (*qa*/litre ratio of 1:1.2)

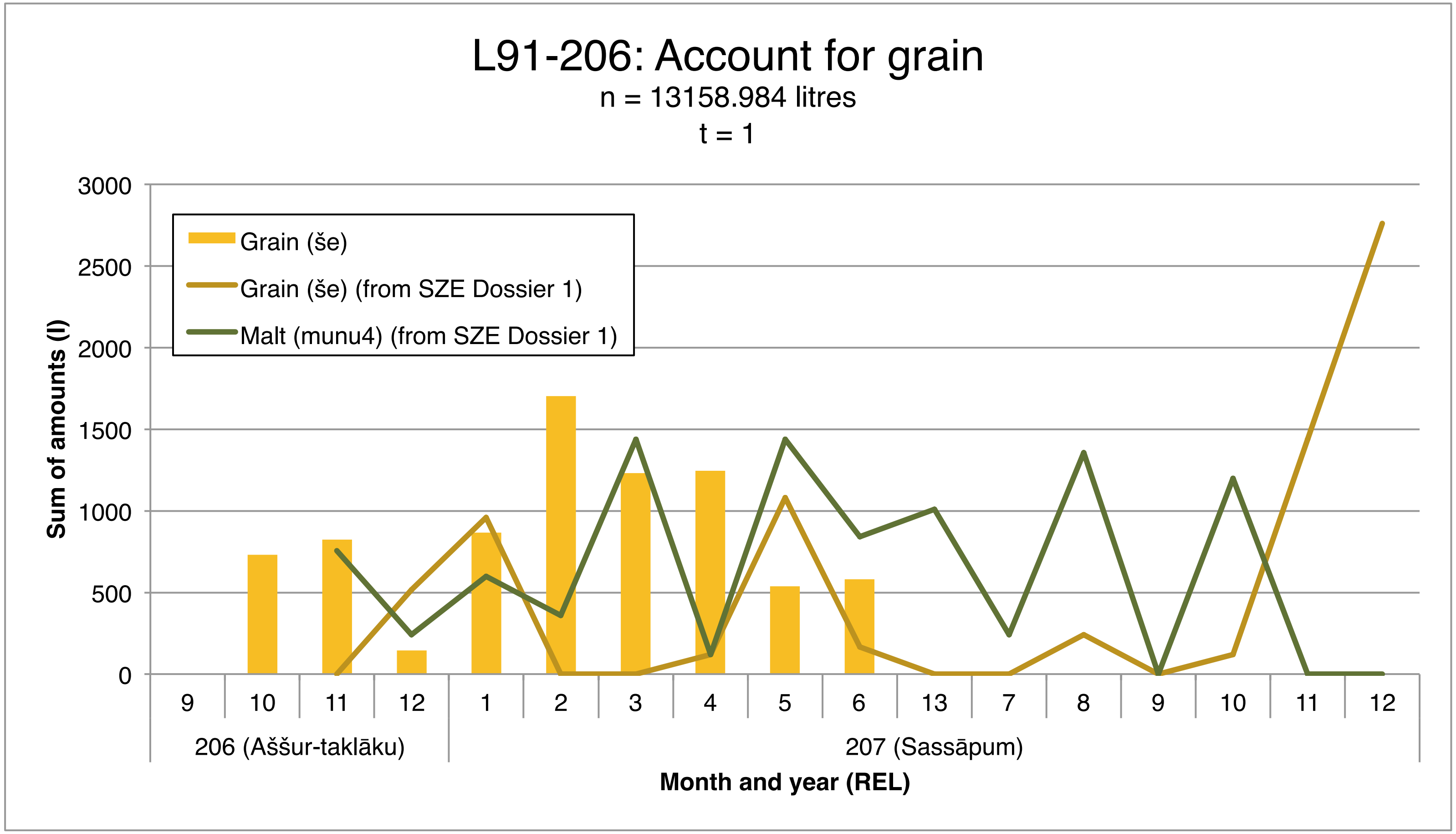


Figure 6.24: L91-206: Sum of amounts of grain used for brewing over nine months (columns) distributed according to month and year with amounts of grain and malt from SZE Dossier 1 added for comparison (lines) (*qa*/litre ratio of 1:1.2)

Drawing on the ratio of grain to processed beer given earlier, a monthly average of 1,060 *qa* as seen in Iltani's household at Qaṭṭarā would translate into 742 *qa* of rare beer (Sum. kaš sig_5). I use this conversion rate (1:0.7) since the overwhelming majority of beer disbursements contained in the dataset are concerned with rare beer (Sum. kaš sig_5) (6.7.3). If accepting the proposed relation of numbers given in SZE Dossier 1 and L91-206, we can take the summary total in the latter text as a basis for estimating monthly production figures at the Qarni-Lim Palace. This gives us 10,869 *qa* (when subtracting grain issues contained in v.09-11) over a period of nine months and 1,207 *qa* of beer grain on average per month. The latter figure translates into 844.9 *qa* of rare beer (Sum. kaš sig_5) monthly. Looking at daily production rates, the brewer at Qaṭṭarā would then have produced 24.73 *qa* of rare beer per day. At the Qarni-Lim Palace at Šehnā, the daily rate would have been 28.16 *qa.* The number of permanent recipients implied by these numbers is fairly small, approximately 20-30 people or less if accounting also for expenses to special occasions, travellers, and so on. We will discuss the comparative value of these numbers after we have considered assemblages relating to beer consumption.

6.7.5 Beer consumption

Based on assemblages of beer disbursement records, we can make corresponding analyses regarding the consumption of beer grain and prepared beer issued to a variety of recipients. A couple of notes on the social context of beer disbursements should be pointed out in advance. First, as demonstrated through studies of the material assemblage from Late Bronze Age Tall Bazi, substantial amounts of beer could be produced with relative ease also at a domestic household level (Zarnkow *et al.* 2006, 2011, also Otto 2012). Second, since beer is derived from the processing and preparation of cereal grains, we should expect the management of beer within the institutional household to reflect, to a certain extent, that of flour and bread discussed earlier (also Milano 1993a, 31). Like flour and bread, beer disbursement records generally relate to less extensive groups of recipients, and, like flour and bread, beer issues are primarily received by individuals and groups close to the palatial household nucleus. The same pattern is underscored by mere practicalities. In all likelihood, the shelf life of processed beer was no longer than a week, and likely considerably less in hot climates. In disbursement records, beer products appear exclusively in daily issues, suggestive of a relatively rapid rate of deterioration of the end product, and individuals are furthermore accounted for as receiving beer for consecutive days.

Beer disbursements contained within the dataset generally employ a terminology similar to records concerned with other subsistence resources. Allowances (Sum. sa2-sag, at Tuttul occasionally Sum. sa_2-dug_4) are ubiquitous in assemblages from Šehnā, Ašnakkum, Tuttul, and Qaṭṭarā, but other designations occasionally appear, e.g. for beer included in meals (Sum. nig_2-gub), as a drinking allowance (Akk. *maštītu*), or as provisions (Akk. *ṣidītu*). Beer disbursements occur in bulk amounts in relation to special occasions, e.g. festivals or gatherings, but predominantly as issues to the 'cellar' (or 'rack', Akk. *kannu*), a short-term storage for beverages, including beer as well as wine (the latter is issued for the cellar at Qaṭṭarā, see e.g. OBTR 252-262 and 264). The cellar appears regularly in the context of beer management, e.g. at Tuttul (for example in KTT 79) and at Ašnakkum. We will consider an example from the latter site in more detail below. The majority of beer issues contained in the dataset relate, however, to the regular, everyday consumption of beer within the palatial household. As with grain allotments, recipients of beer appear in the records with reference to name, gender and age, and, occasionally, profession. If abiding by managerial divisions inferable from the administrative documentation, the assemblages considered here furthermore present some tangible social divisions, especially within the palatial household. We will consider these divisions in more detail in relation to our discussion of the Ašnakkum beer disbursement records. There are two principal assemblages of beer disbursement records in the dataset. One is a cache of 447 tablets from the Qarni-Lim Palace at Šehnā (van de Mieroop 1994), another 194 tablets from the palace at Ašnakkum (Tunca and Baghdo 2008). Since the former is only partially accessible, we will concentrate here on the latter and use the Šehnā assemblage for comparative purposes.

The majority of administrative records from Ašnakkum comprise four distinct series. These include issues to the palace cellar (Akk. *kannu*) (Series (Group) ASZ 1), varied numbers of palace dependents, notably females (Series (Group) ASZ 2), a small group of texts relating to issues of mixed beer (Series (Group) ASZ 3), and a group of disbursements to various individuals and visitors (Series (Group) ASZ 4) (these archival divisions are largely in agreement with those offered in Lacambre and Millet Albà 2008d). All of these are encompassed in the analytical group Dossier (Group) ASZ 1), which account for an aggregate preserved amount of 7,557 litres of beer (Figure 6.25).

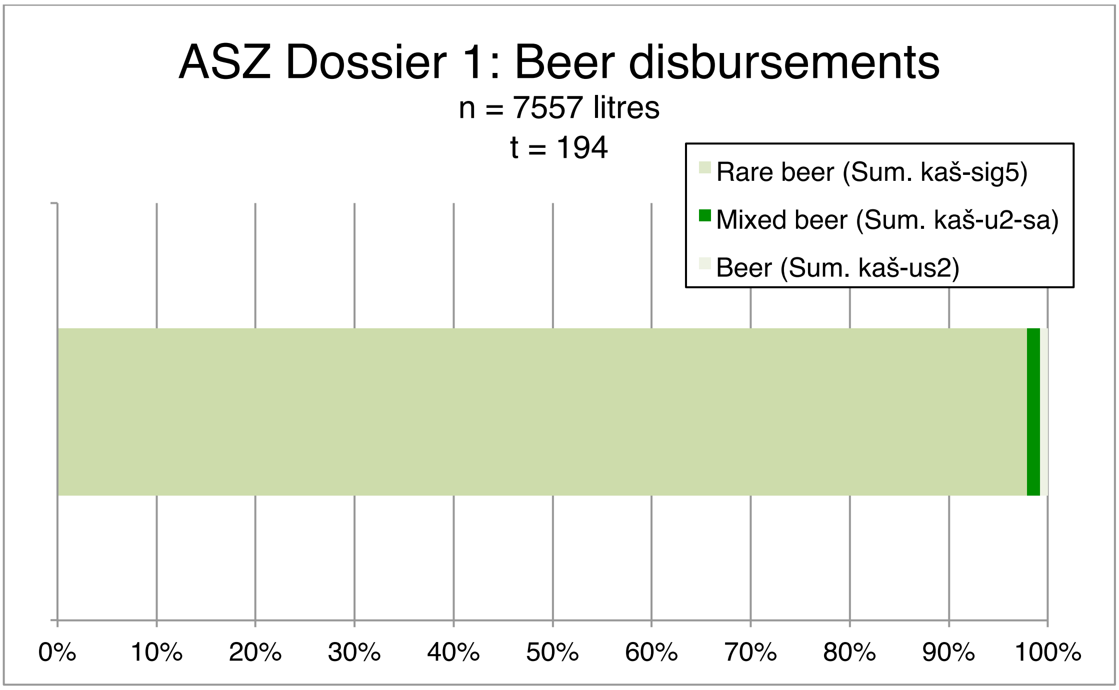


Figure 6.25: ASZ Dossier 1: Resource proportions according to resource type in ASZ Dossier 1 (*qa*/litre ratio of 1:1.2)

The next step is to consider these numbers on a temporal axis. Of the 194 texts assigned to Dossier (Group) ASZ 1, 132 gives a partial or complete date. Of these, 119 can be securely associated with a year, accounting for 61% of all texts and 88% of all preserved amounts. Eliminating a few outliers from years removed from the main group, we end up with a lot of 111 dated texts dating to REL 191-196. These are plotted in the figure on the next page (Figure 6.26). Ordering texts and associated amounts according to year and month, the total 111 texts, or 57% or all texts contained in Dossier (Group) ASZ 1 account for a total 6,642 litres of beer, or close to 88% of all preserved amounts. Limiting ourselves to observations on the eponymal year of Nimar-Suen (REL 195) to which most of the datable part of the assemblage relates, the total amount of beer preserved in all entries is 4,470 litres, well below the annual inputs seen at Qaṭṭarā and Šehnā (6.7.4). We can, however, amend this number to a certain extent, if turning to an assessment of the number of people in receipt of beer from the palace brewery. This requires us to look at the various series contained in ASZ Dossier 1 individually.

The series of beer disbursements for the cellar (Akk. *kannu*) (ASZ Series 1) concerns issues in the range of 50-100 *qa* of rare beer (Sum. kaš sig$_5$) per day, occasionally increasing to 300-400 *qa* on festive occasions or dwindling to less than 50 *qa* in a few instances (Figure 6.27). While there is no clear overarching pattern, it seems evident enough that issues for the cellar were delivered on a daily basis, the average of which, as derived from all entries, lies at c. 70 *qa* per day (Lacambre and Millet Albà 2008a, 230). As should be evident from the two extraordinary issues of several hundred litres of beer, issues to the cellar were consumed on the occasion of more extensive social gatherings, and so it seems natural to assume that the average amount would cover allotments for a group of permanent recipients within the palatial household. The average daily rate of 70 *qa* would, if we assume issues to have been consumed in allotments of a size comparable to those found in ASZ Series 4 (see below), have been enough to sustain some 35 people.

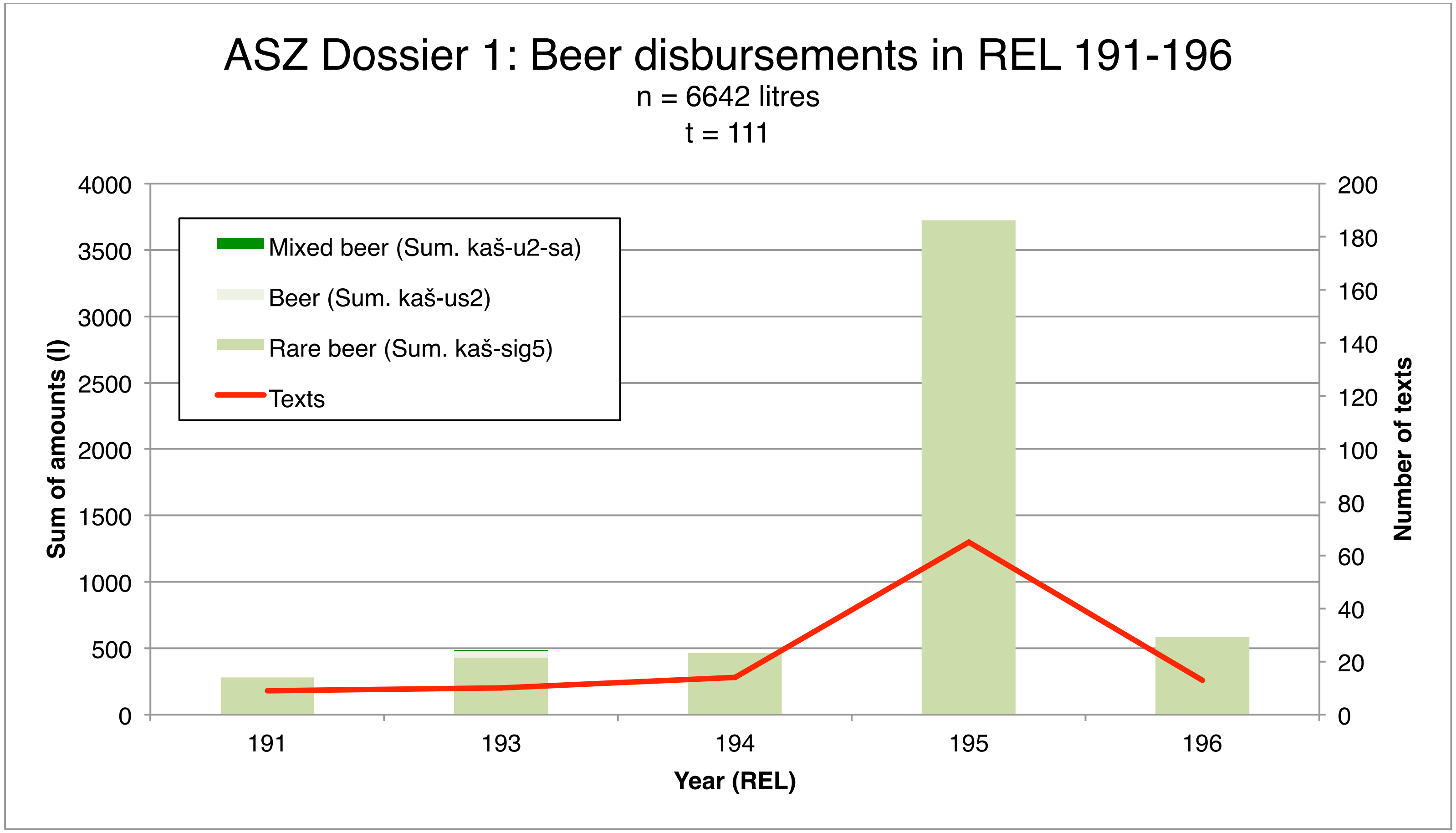


Figure 6.26: ASZ Dossier 1: Sum of amounts (columns) in dated texts from REL 191-196 distributed according to year with number of texts per year (line) (*qa*/litre ratio of 1:1.2)

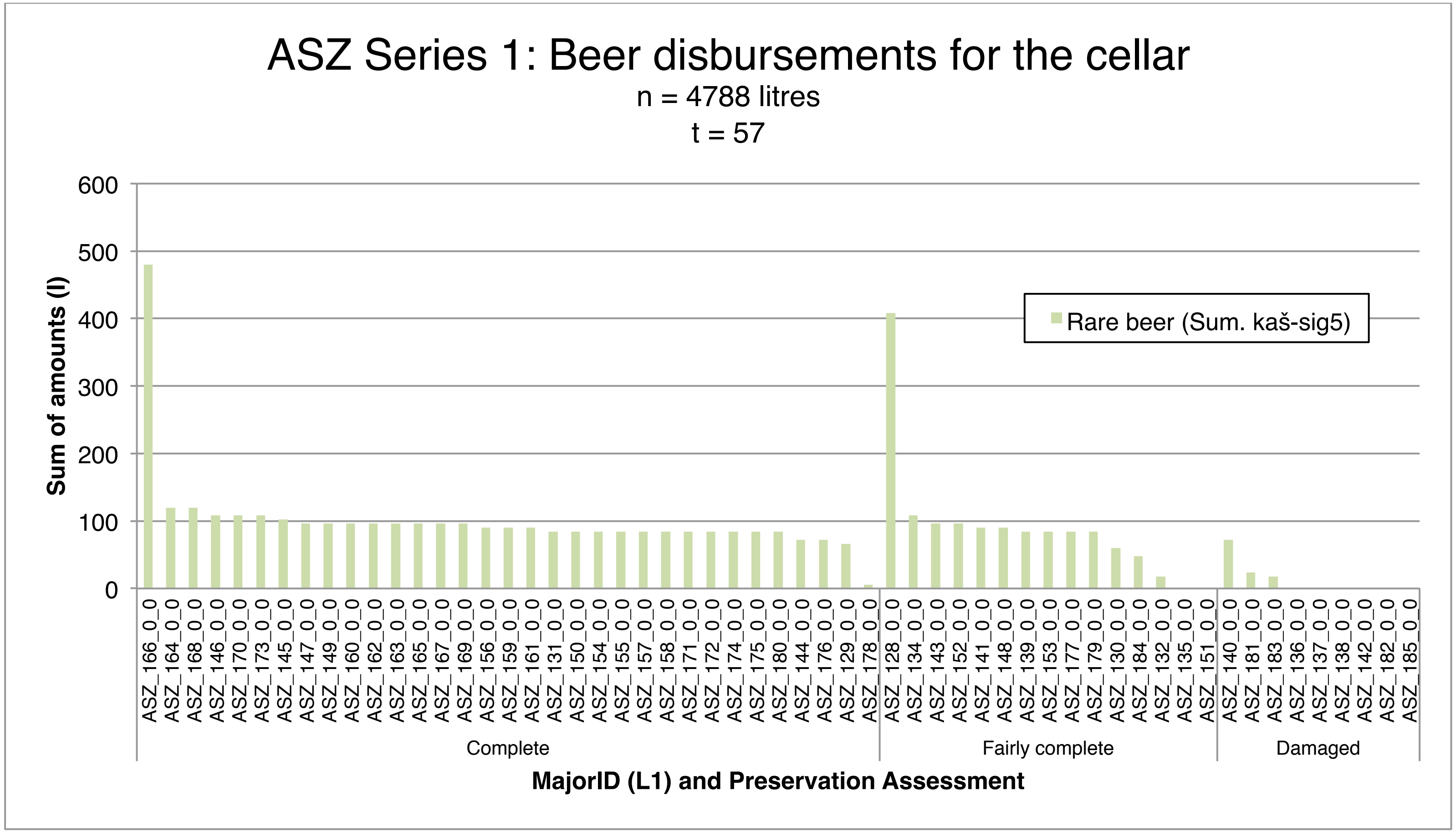


Figure 6.27: ASZ Series 1: Sum of resource amounts (columns) ordered by text and state of preservation (*qa*/litre ratio of 1:1.2)

The second series (ASZ Series 2) includes 91 disbursement records in a rather poor state of preservation. The preserved information relates exclusively to women and children of the household of the local lord, but occasionally includes allotments to other individuals. Lacking reliable data on overall daily amounts of beer issued in this series, we can reconstruct a fairly reliable number from individual allotment sizes (Figure 6.28). The distribution of allotment sizes generally points to an issue of one *qa* of beer per day as the standard size for adults and adolescents, with larger allotments of three *qa* also appearing. Among the permanent recipients attested in the series, issues of one *sūtu* are given exclusively to a woman named Ramarum, the first wife of Sîn-iqīšam, lord of Ašnakkum. Issues of five *qa* are given to his second wife, Undulla, and on at least one occasion to another female member of the household (see Millet Albà 2008, 247-271 for a detailed discussion of this group).

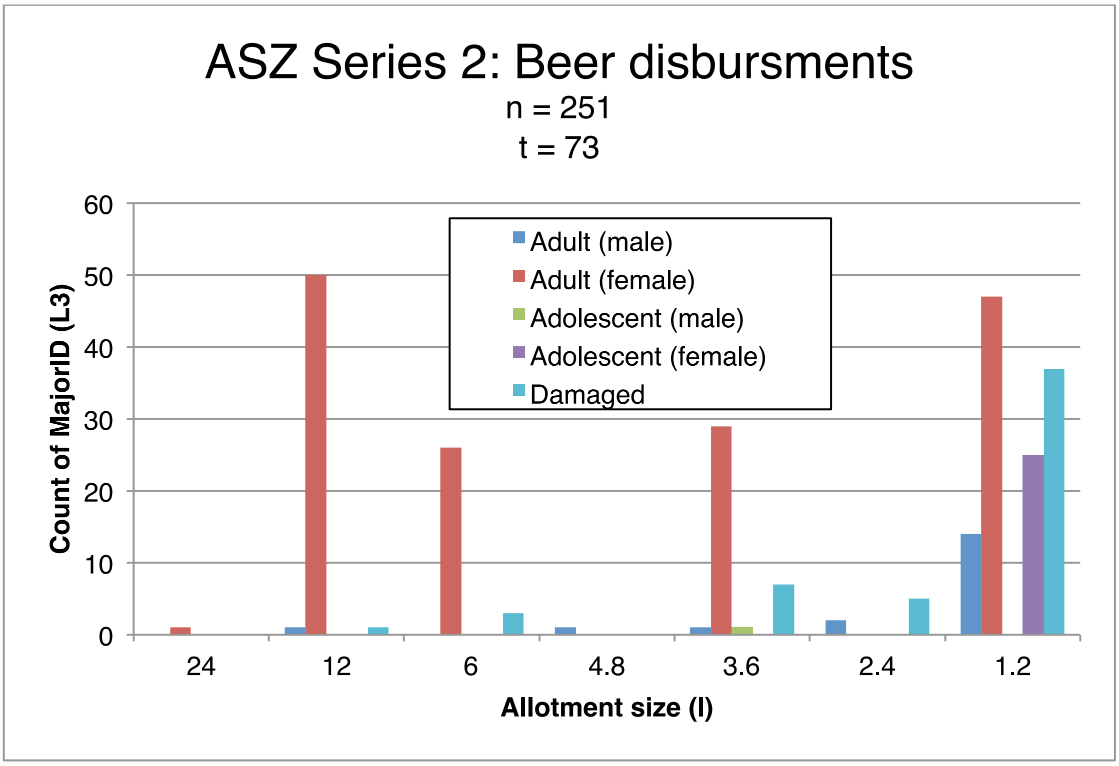


Figure 6.28: ASZ Series 2: Count of preserved allotment sizes (columns) in 73 texts according to gender and age (*qa*/litre ratio of 1:1.2)

Entries with named individuals, which makes up the bulk of the series, generally do not exceed more than 15 recipients in any one text, and regularly occurring recipients seem to constitute only 10-11 people (see e.g. the synoptic comparison given in Millet Albà 2008, 272-279). If basing our estimate on the permanent group of recipients appearing in this assemblage, we can suggest some 25 *qa* to have been consumed by this group each day by an average ten individuals (Figure 6.29).

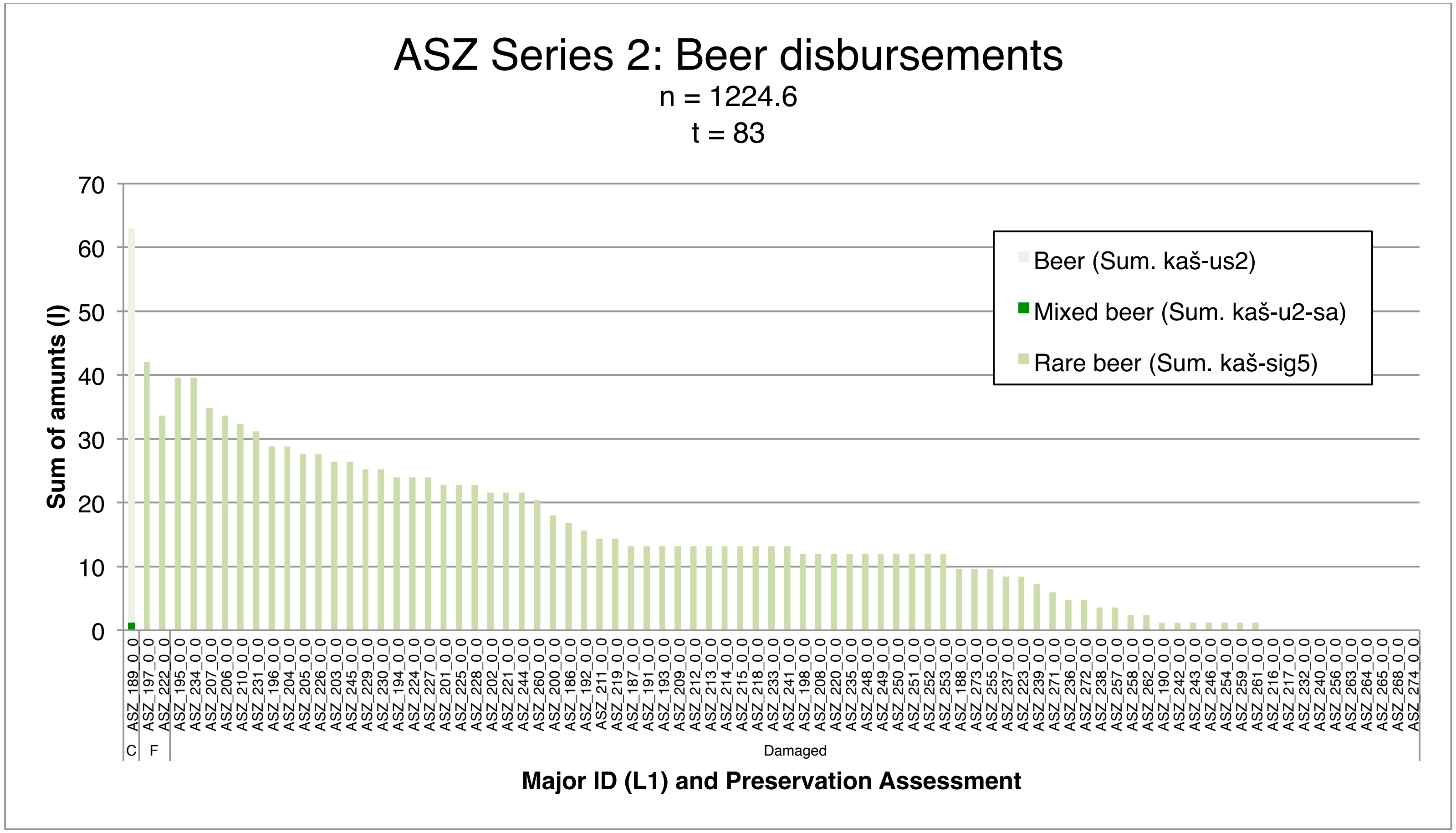


Figure 6.29: ASZ Series 2: Sum of amounts (columns) by text and preservation assessment (*qa*/litre ratio of 1:1.2)

The last extensive series contained in the current dossier is ASZ Series 4, a well-preserved set of 41 disbursement records. These concern issues to a variable selection of people and groups, the majority of which only occur in the series sporadically. The overall average is close to 30 *qa* per record. The larger size of individual allotments (Figure 6.30) may point to issues for travelling envoys similar to what we could observe at Tuttul (see 6.6.5). We should expect this type of issues to be more irregular in nature, and so it can be hard to extrapolate from the numbers given here. With an average rate of consumption of 30 *qa* per day, and in light of the distribution of allotment sizes, we will assume no more than 10-15 individual allotments here (Figure 6. 31).

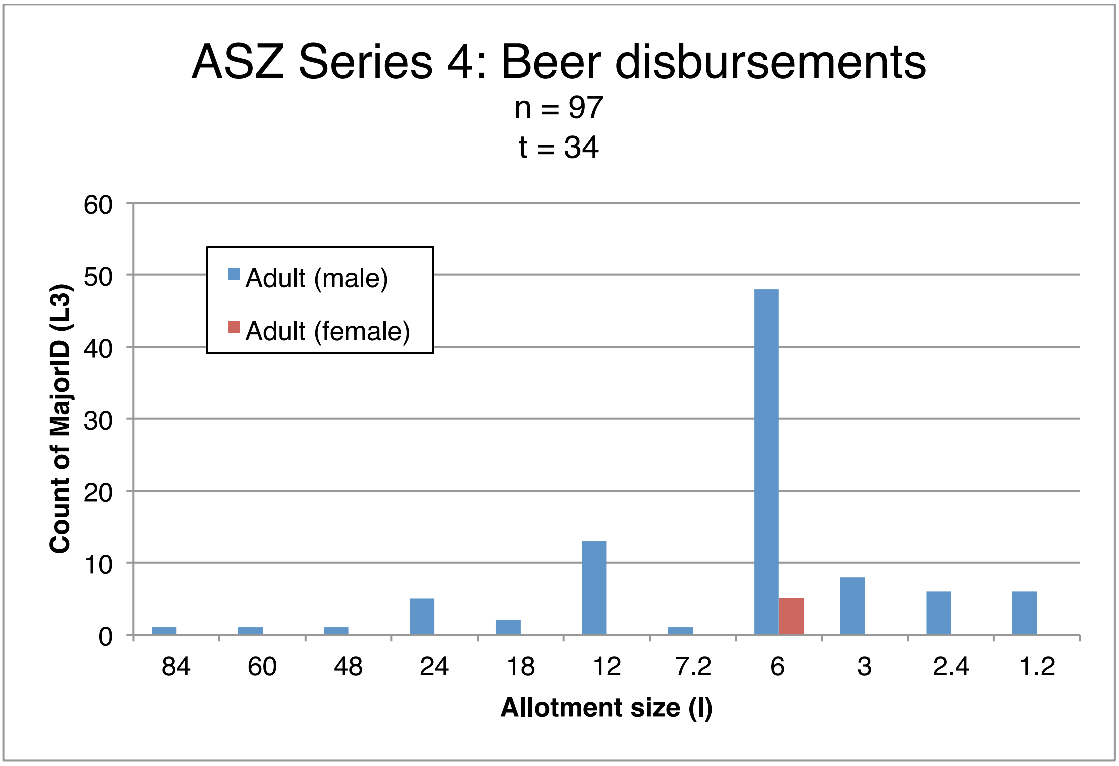


Figure 6.30: ASZ Series 4: Count of individual allotment sizes (columns) from 34 texts according to gender and age (*qa*/litre ratio of 1:1.2)

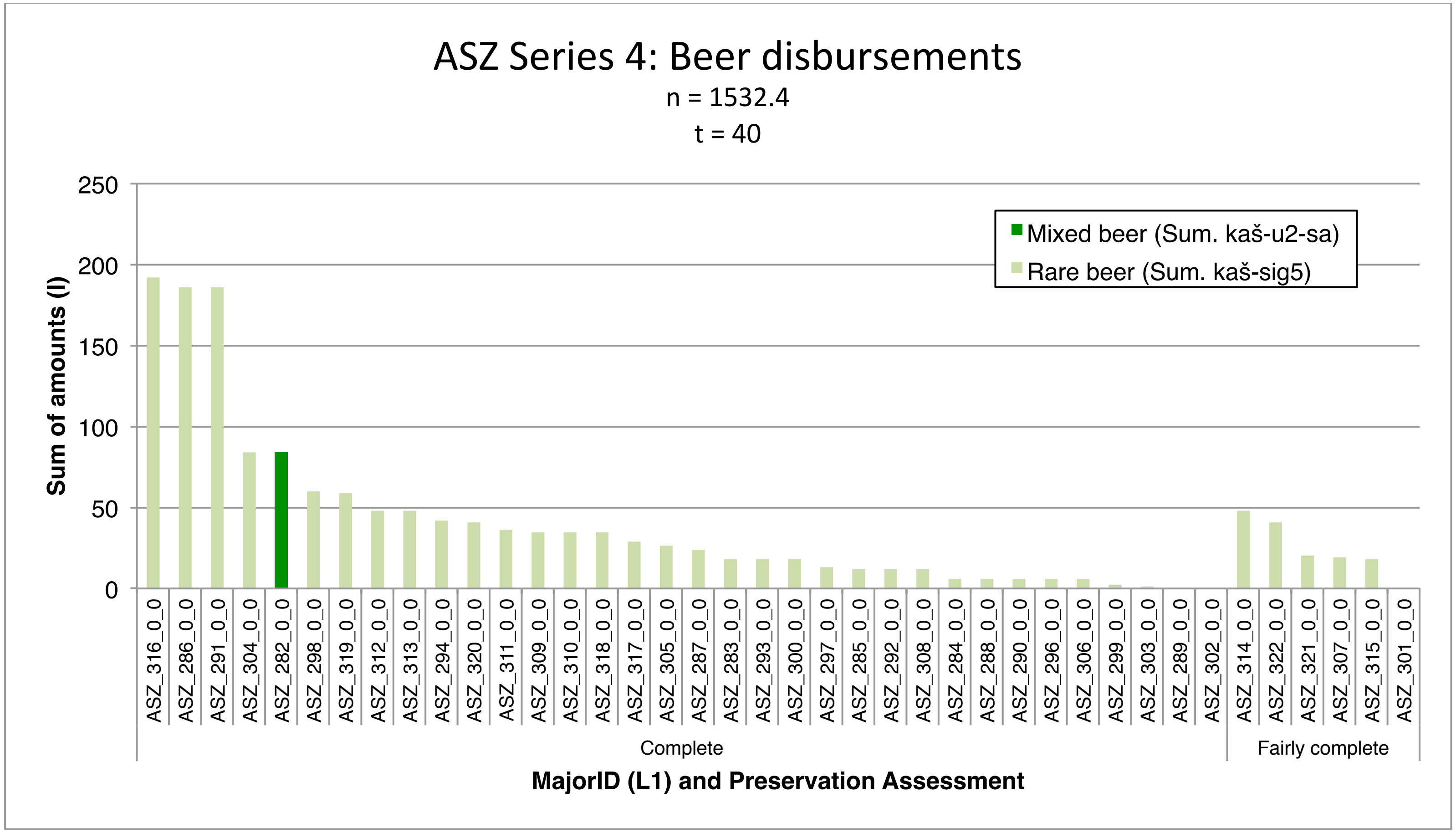


Figure 6.31: ASZ Series 4: Sum of amounts (columns)
by text and state of preservation (*qa*/litre ratio of 1:1.2)

Drawing together observations given for ASZ Series 1, 2, and 4, the average amount of beer issued per day from the palace brewers amounted to c. 125 *qa*. This supported an estimated 60 individuals throughout the year. Scaling up this number, beer production within the palace at Ašnakkum would then have a monthly output of 3,750 *qa,* or 45,625 *qa* of rare beer (Sum. kaš sig_5) annually. This number is obviously a tentative estimate, but it is of some encouragement to note that the only text on cereals for beer brewing available from Ašnakkum fits the above calculations quite neatly. In OBTCB 62, we find an issue of 573 donkey-loads (57,300 litres) of beer grain (Sum. še kaš). The dating of the text omits the day, and makes no reference to the timespan that should be covered by this otherwise huge amount of grain. Yet if converting the number according to the ratio for rare beer (Sum. kaš sig_5), we arrive at 40,110 *qa* of beer, rather close to the projected annual consumption given above.

We can compare estimates given above to select texts from the Qarni-Lim Palace at Šehnā, namely a dossier (SZE Dossier 2) comprised by 25 texts forming part of a much larger group numbering 447 disbursement records in total (van de Mieroop 1994, 310). The dossier stems from the same administration that produced the receipts for beer grain and malt discussed earlier, namely SZE Dossier 1 and the clearance account L91-206 (see 6.7.4). Not surprisingly, the overwhelming majority of beer accounted for in SZE Dossier 2 is rare beer (Sum. kaš sig5), with very small issues of mixed beer (Sum. kaš u2-sa) appearing on two occasions (Figure 6.32). The aggregate total of preserved amounts in this dossier counts c. 1,290 *qa*. Of the 25 daily disbursements included, the majority records c. 40 *qa* of beer per text, while a handful concern slightly higher amounts, at c. 100 *qa* of beer. Only a single text, L91-391 stands out, accounting for a unique sum of 370 *qa* of beer (obviously for a special occasion, as noted by van de Mieroop 1994, 322). Given the smaller sample, this may distort the daily average, which is either 54 or 40 *qa*, depending on whether we include L91-391 or not. The recipients listed reflect managerial segments seen at Ašnakkum. Appearing in all but three of the records, we find a group of women (Sum. geme2-meš-lugal) of the palace, who receive the largest share of the beer distributed, on average 24 *qa*, though the amount varies from 32 to, on a few occasions, down to 10 *qa* (Figure 6.33). No other groups appear with the same frequency. Occasional inclusions of messengers (Akk. *mār šipri*) and sedan carriers (Akk. *ša nubālu*) likely indicate that the disbursement records combine issues for permanent residents, messengers, and travellers.

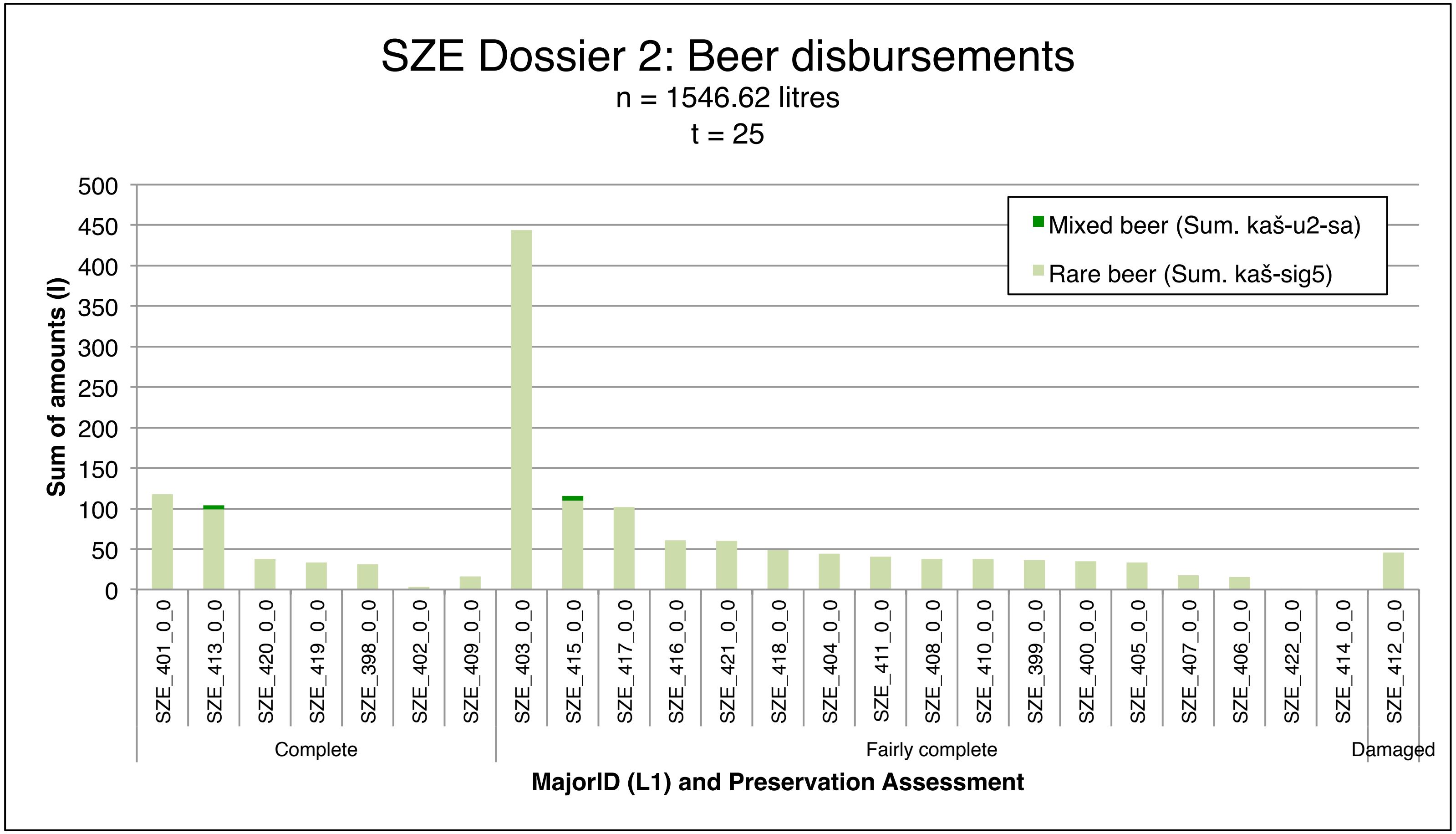


Figure 6.32: SZE Dossier 2: Sum of amounts (columns) by text and state of preservation (*qa*/litre ratio of 1:1.2)

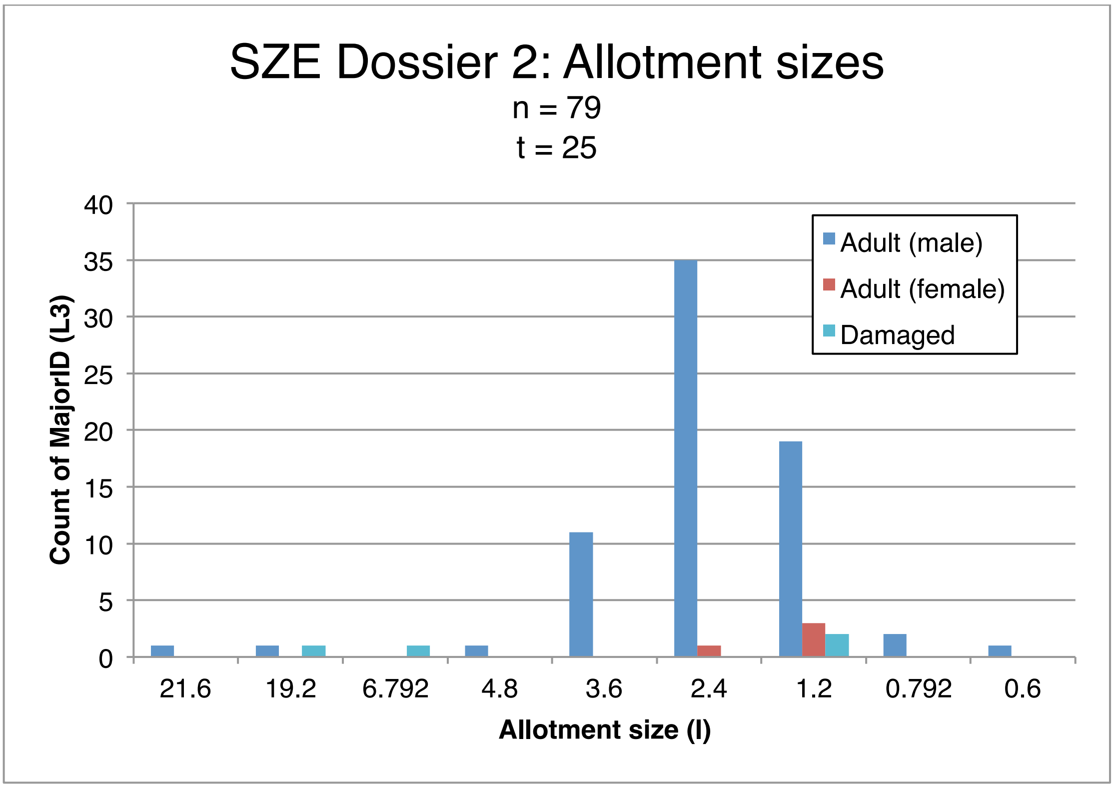


Figure 6.33: SZE Dossier 2: Count of individual allotment sizes (columns) according to gender and age (*qa*/litre ratio of 1:1.2)

The average size of allotments, again when excluding L91-391, equally mirrors those found at Ašnakkum (Figures 6.28 and 6.30). The majority of individual allotments amount to either 1 or 2 *qa*. While we cannot establish any secure number for the group of female servants, the average 30-20 *qa* suggests then an equal or smaller number of persons. The same ratio can be extended to account for the overall average, which leads to the conclusion that beer production accounted for by the beer disbursement records from the Qarni-Lim Palace maintained a core group of residents numbering perhaps a couple of dozen, with additional amounts issued for travellers and envoys. As will be readily apparent, this number agrees with the one proposed based on overall production capacity as derived from the receipts of raw commodities (6.7.4).

6.7.6 Beer: general observations

In a comparative perspective, the three examples considered here align rather well. For Ašnakkum, we can observe an internal agreement between the approximated scale of annual beer production and the issue of beer grain given in OBTCB 62. The divergence between the two is only a little over 10%. The dossiers from the Qarni-Lim Palace at Šehnā are less in agreement. The annual production rate extrapolated from L91-206 gives just over 10,000 *qa*, while the dossier of grain and malt issues (SZE Dossier 1) is hard to match to the monthly rate emerging from the disbursement records (see also comments by van de Mieroop 1994, 316-317). The highest monthly and annual rates are provided by the disbursement accounts, and are the ones incorporated in the table below (Table 6.27).

	Month (*qa*)	**Year (*qa*)**	**People**
Ašnakkum	3750 *qa*	45,625 *qa*	60
Šehnā (Qarni-Lim Palace)	1614 *qa*	19,365 *qa*	30
Qaṭṭarā	574 *qa*	6,888 *qa*	20

Table 6.27: Estimated rates of beer consumption per month and per year at Ašnakkum, Šehnā, and Qaṭṭarā

The above examples serve to demonstrate that we can establish some agreement in the scale of beer production and consumption within the institutional household when comparing data from multiple historical examples. If taking the number of people in receipt of grain allotments at Ašnakkum as a benchmark, the table just presented further suggests that beer consumption, at least within the present dataset, involved a comparatively smaller group of people. I discuss the broader implications of this discrepancy in the concluding section (see 6.11).

6.8 Oil and fat

I discuss later the agricultural basis for the cultivation of oil-producing crops (7.2.3) and the rearing of livestock as a source of animal fat (8.4). Here, I review the evidence for the circulation of various vegetable oils and animal fats within the institutional household economy. In contrast to modern culinary preferences, vegetable oils occupied a different place in dietary regimes until the beginning of the 20th century CE, especially with respects to the distinction between fluid (vegetable) and solid (animal) sources of fat, a factor which will have influenced storage practices, among other things (O'Keefe 1999, 376, Serpico and White 2000, 390-391). ‘Oil’ can mean several different things in cuneiform and the semantic emphasis in written documentation regularly appears more concerned with the functional qualities of the product rather than its material origin (Durand 1983, 126). The basic sign for oil in the administrative record is 𒉌 (Sum. i$_3$, Akk. *šamnu*). In the present data set, this appears almost exclusively qualified as i$_3$-giš, literally ‘tree oil’, but commonly understood as a generic reference to plant oil, in opposition to lard (Sum. i$_3$-šah$_2$), or other types of animal fat, e.g. ox fat (Sum. i$_3$-gu$_4$) or sheep fat

(Sum. i3-udu) (for a useful summary of Sumerian and Akkadian terms, see Postgate 1985, 145).

Plant oil for consumption has traditionally been seen as one of the staple subsistence commodities of redistributive systems (Gelb 1965, 233-235). There is no pertinent evidence for oil as an integrated element of such practices in the current dataset, though this is most likely a consequence of the limited number of texts relating to oil disbursements. Regular issues of oil for larger groups of dependants are generally absent, and oil disbursements appear almost exclusively as issues to visiting parties such as dignitaries and messengers. We should note evidence for oil allotments to palace dependants found at Mari, e.g. ARM 22, Text 69 where 1.5 gur is assigned for 'palace oil rations'. The management of oil within the palace included most types of vegetable oils and animal fats, with little sign of a strict administrative distinction between the various types discussed below, e.g. at Šehnā (Vincente 1991, 388). Though sesame oil and lard are the most extensively attested fats, administrative records also encompassed oil of a variety of other types, and other types of animal fats (consider e.g. Soubeyran 1984, 415-418 for an overview of types in an administrative context at Mari). An inventory record (OBTR 204) from Iltani's archive at Qaṭṭarā lists juniper oil, syrup, resins, along with various types of lard and mutton fat (Sum. i3-udu), and also fruit and vegetables in the same account. Information on storage and circulation is largely accidental. The aforementioned text from Qaṭṭarā refers to oils and animal fat as stored in various types of ceramic vessels, in contrast to a variety of fruits and resins, which are stored in baskets or wooden containers.

6.8.1 Sesame oil

I assume that Sumerian i_3-giš is to be associated with the oil of sesame (*Sesamum indicum*) (see also 7.2.3). The domesticated variety of sesame likely originated in the Indian sub-continent, and is attested in the Tigris-Euphrates drainage by the mid-3rd millennium BCE (Zohary *et al.* 2012, 113). Thus for much of the Early Bronze Age, lard appears to have been the principal source of fat, at least in the alluvium (Gelb 1965, 233-234). While sesame seeds had a range of culinary uses, sesame oil could be applied in an even wider range of roles, as a condiment, as ointment, for ritual uses, as lamp fuel, and occasionally as a lubricant for tools and other utilities (Potts 1997, 66). The processing of sesame seeds into oil requires soaking of the seeds and subsequent pressing, preparatory stages also attested in the cuneiform record (Postgate 1985, 145-147). The taste and quality of the oil may be improved by de-hulling and roasting of the kernels, but these stages are not mandatory for oil extraction (Bedigian 1999, 412-413).

The ratio of seeds to extracted oil is given in a handful of texts from across the Bronze Age (Table 6.28), and indicates a generally uniform equivalent of five measures of seeds to one measure of oil (Postgate 1985, Waetzoldt 1985, 81, Stol 1985b, 124). Designated oil-pressers (Sum. i_3-sur, Akk. *ṣāhitu*) appear occasionally, e.g. at Tuttul, where three men are in receipt of grain allotments (KTT 287). As noted by Jakob, the seasonal nature of their work may have meant that oil-pressers were not permanently associated with smaller households (Jakob 2003, 409), but this matter cannot be clarified further here (see also Postgate 2013, 114).

	Text	Sesame to sesame oil	Ratio
EB	MVN 5, 155 (iii.5-6)	2,732 to 548.4 (*qa*)	5:1
MB	BIN 7, 158 (v.11-12)	60 to 12 (*qa*)	5:1
LB	MARV 1, 33 (v.1-4)	40 to 8 (*qa*)	5:1

Table 6.28: Sesame oil extraction rates

With regards to their work, a text (KTT 177) from Tuttul dated to the beginning of March accounts for a total of 5,400 litres of sesame seeds given over to ten oil-pressers as a work assignment. Following the rate of extracted oil given above, this would require each man to produce from 540 litres of sesame seed 108 litres (or nine *sûtu*) of sesame oil. The amount of time required to press bulk amounts of sesame seeds into oil is somewhat obscure. YOS 13 359 suggests that one man could press 1 gur (here 300 *qa*) of sesame seeds within a period of 10 days, thus with an average processing rate of three *sûtu* of seeds for a resulting six *qa* of oil per day (Stol 1985b, 124). Applying this approximation to the above example from Tuttul would require exactly 15 workdays per oil-presser. As sesame is a summer crop grown from June to October (Serpico and White 2000, 398), the date of KTT 177 implies continuous pressing of stored seeds throughout the year. According to the summary, the batch of sesame seeds issued originates from a storage facility (Akk. *našpaku*), which, as we have seen earlier, could also be used for the storage of cereals (but note dedicated storages for oil at Mari discussed by Durand 1983, 126-129). References to the management of sesame oil in the dataset are sparse and should be approached with caution when drawing out more general conclusions. A dossier from the Eastern Lower Town Palace at Šehnā (SZE Dossier

3) counts one receipt and 17 disbursements (SZE Series 1). 16 of these date to the year of Habil-kēnu (REL 224) and relate, as noted by Vincente, mostly to the same visit by important dignitaries (Vincente 1991, 367-368).

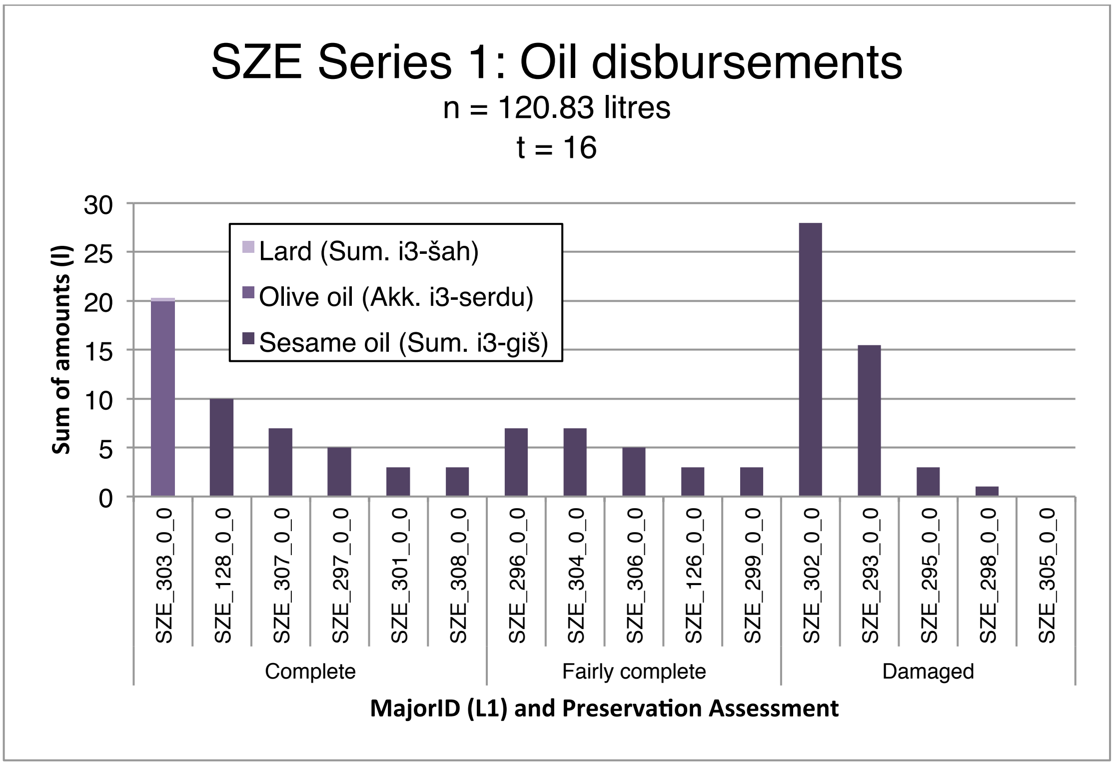


Figure 6.34: SZE Series 1: Sum of amounts (columns) by text and state of preservation (*qa*/litre ratio of 1:1)

All of the issues listed here (Figure 6.34) are particular in nature, and relate to special occasions, e.g. sesame oil used for purchase, and a batch of olive oil and lard given to an individual released by the king. The majority concerns issues to a large group of delegates or messengers (Akk. *šiprūtu*) present at Šehnā in the last months of REL 224. The two additional oil disbursement records from REL 225-226 edited by Ismail offer little further, one (Ismail 1991 126) being a list of 2.5 litres of oil given to various local lords, presumably as gifts, another (Ismail 1991, Text 128) the account of issues of a total eight litres for an offering and various persons involved (see Vincente 1991, 382-386 for a discussion of this dossier). Duplicate issues of oil for 220 emissaries given in Vincente 1991 Text 149 and 160 suggest an individual oil ration reminiscent of common subsistence allotments for dependents in the Bronze Age alluvium. For male adults, Gelb gives a range of 2.5-5 *qa* per month, which translates into 5-10 *šiqil* per day (or 1/12 – 1/6 *qa*) (Gelb 1965, 234-235). The disbursement from Šehnā gives an issue of just under two *šiqil* per person, presumably for a single meal. The above survey gives only faint hints with regards to the amount of sesame oil managed by the institutional household. While disbursement records contained in the dataset are occupied with very modest amounts, usually not exceeding a couple of litres per entry, the batch of sesame seeds assigned for pressing in KTT 177 implies the preparation of more than 1,000 *qa* (or, converted according to the *kinâte*-measure, close to 1,300 litres) within a period of one month. Examples from institutional household economies from the Early and Middle Bronze Age alluvium present figures equivalent to 20-30,000 litres of sesame oil, e.g. from Ur and Larsa, but we cannot securely relate these numbers to annual oil production[4].

6.8.2 Olive oil

I discuss the extent and intensity of olive cultivation and the harvest and processing of olives in the next chapter (7.2.6.2). References to olive oil are dictated very much by geography. In the Middle Bronze Age, Sumerian giš-i_3 (or i_3-giš) can be used in reference to the oil of both sesame and olive, and interpretation is therefore sometimes dependent on external factors. The original meaning of giš-i_3 ('oil tree') is underscored by written records from mid-3rd millennium BCE Ebla where thousands of olive trees are accounted for. The Akkadian word for olive tree is *serdu*, but this term only appears more frequently further south during the Middle Bronze Age, particularly at Mari (Waetzoldt 1985, 77). Attestations in the Middle Bronze Age record from elsewhere east of the Euphrates remain sparse, however, and the only explicit mention of olive oil in the current dataset is an entry on two *sūtu* of olive oil (Akk. i_3 *serdi*) in a text from the dossier on oil disbursements at Šehnā (SZE_303_1_1). Sources from Mari suggests olive oil to have been much less common in the Jazīrah than sesame, and most likely imported from the Bilād al-Šām rather than produced locally. The most extensive documentation on Bronze Age olive cultivation comes from Ebla, where the mid-3rd millennium BCE archives contain a selection of inventories concerned with royal lands, substantial tracts of which are planted with olive trees (Archi 1991).

As should be expected from the above survey, olive trees and, perhaps, oil are more common in the documentation from Alalah. Epistolary and legal sources talk of olive groves in the hinterland (e.g. Durand 2002, 82-84, von Dassow 2008, 293-294 respectively). The oil appearing in three administrative texts (ATaB 30.12 and 43.02-

[4] Potts 1997, 68 with further references. Note here, however, that the author mistakes sesame seeds (še-giš-i_3) for oil (giš-i_3). The sesame oil equivalent to the numbers given by Waetzoldt (for UET 3, 1129 r.11-13) and Butz (for YOS 5, 153 v.1) are ca. 28,200 *qa* and 20,000 *qa* respectively. It further remains an open question whether all of the given seeds would be processed into oil.

03) can, in orthographical terms, be both olive or sesame oil, but the use of Sumerian giš-i_3 within the Bilād al-Šām obviously suggests that we are dealing with the former rather than the latter. These all relate to a settlement named Murar, presumably located further south in the Orontes Valley, which delivered oil to the lord of Alalah on several occasions (the relationship between Murar and Alalah has been admirably perused recently, cf. Lauinger 2015, 85-94). Oil is here measured in stones (Akk. *abnû*), a measure also used for honey or syrup in a contract (ATaB 20.07, cf. discussion by Lauinger 2015, 88). The value of this measure is unknown, and so the amounts, respectively 57 stones of oil in ATaB 43.02 and 183 stones of oil in ATaB 43.03 tell us only very little (while several stone vessels were retrieved from Room 2 of the Level VII palace, the volume capacity of published examples appear to be five litres or less, cf. Woolley 1955, 295-296 and Plates 280-283). In ATaB 30.12, a total 2,768 stones of oil is given as the amount supplied by the town of Murar to the palace at Alalah, but we are again left with no idea of the scale or regularity of these transactions (Lauinger 2015, 90-95).

6.8.3 Lard and other types of animal fat

As we have already seen, examples suggest an overlap between the management of vegetable oils and animal fat, at least in an intra-palatial context. Durand has commented upon the metrological distinction between vegetable oils (which were measured in capacity units) and animal fats (which were weighed) at Mari, but this separation is less evident in the Jazīrah, where capacity measures are employed for both (Durand 1983, 126-128). The dataset contains rather few references to animal fat, and here mostly lard (Sum. i_3-šah). A singular reference to the boiling of ox fat (Sum. i_3-gu_4) appears in a side note in a text from Ašnakkum (CB III 171). Elsewhere, the aforementioned inventory text from Iltani's residence at Qaṭṭarā mentions two pots of mutton fat (Sum. i_3-udu) (OBTR 204). Fat from birds (Sum. i_3-mušen), presumably goose, is absent from our dataset, but could play a role in areas where waterfowl could be accommodated for in larger numbers, e.g. on the Middle Euphrates and in the Orontes.

Lard (Sum. i_3-šah) is the most well attested type of animal fat here, which keys in well with the widespread rearing of pig for meat production across the dry-farming plains (8.4). Lard had a range of uses extending beyond its role as a primary source of fat in culinary regimes, notably as an ointment, for greasing, and as a supplement in weaving and leatherworking (Weszeli 2009, 324). Assuming that OBTR 204 and 205 are two inventories drawn up at the same time to account for various commodities contained within Iltani's household, several donkey-loads (translating into hundreds of litres) of lard were kept in store in the palace at Qaṭṭarā, as opposed to two pots of mutton fat. There is no pertinent information on where or how these commodities were acquired, however. A stray tablet from Ašnakkum (OBTCB 10) accounts for the belated receipt of 52 *qa* of lard from two farmers, but the textual assemblage otherwise lacks relevant documentation.

6.9 Sweeteners

Sweeteners are considered here with reference to a range of different types of fruit syrups, derived from dates, figs, grapes, and pomegranate, and honey, derived from honeybees (*Apis* sp.). With syrup (Sum. lal_3, Akk. *dišpu*) I support, in general, an interpretation of the Akkadian and Sumerian cognates as referring to fruit syrups. The exact nature of the substances to which these terms refer has been subjected to quite some debate in the literature (Dalley 1984, 84, Powell 2003, 17). The discussion cannot be firmly settled here, but I offer some critical comments on apiculture and honey production on the next page.

6.9.1 Grape syrup

Administrative records contained in the dataset frequently make joint reference to wine (Sum. geštin) and syrup or honey (Sum. lal_3), further confounded by epistolary sources where deliveries of wine are often accompanied by deliveries of syrup or honey, e.g. as given in a letter sent to Yasmah-Addu by Aplahanda, king of Karkemiš:

> "To Yasmah-Addu, say, thus (speaks) Aplahanda, your brother: Now I have had Yabi-Addu and Yawi-Ila bring you 50 jars of the wine (geštin) that I drink, 50 jars of syrup (lal_3), 1 textile, and 5 talents of abrasive stone." (ARM 5 13, LAPO 16 254)

A receipt of goods from Šehnā conveys the same information, with reference to one jar of wine (geštin) and three jars of syrup or honey (lal_3) (cf. Ismail 1991, Text 11). Grape syrup has a long history in Roman and Greek cuisine, as Latin *defrutum*, made from condensed fruit juice. Pliny the Elder describes this substance as made from grape must boiled down to half of its original volume. If condensed to only a third, the syrup was called *sapa* in Latin (Greek *siraeum* or *épsima*). In this form, the syrup could be used for flavouring of a range of foods or to fortify wine (see for an application of the Latin framework to specific types of wine at Mari e.g. Durand 1983, 109). The easy association of both honey and grape syrup with fortified wine naturally renders exact identification largely tentative. An odd line in a letter concerning an estate in the vicinity of Alalah talks of “the field of her grape (Sum. geštin) and (the field of) her honey (Sum. lal_3)” (FM 7, Text 36 v.29). While Durand, in his primary edition of this text, interprets these as separate locales (‘son vignoble ainsi que son champ à miel’, cf. Durand 2002, 82), a more literal reading could well be “the field of her wine and her syrup”, implying that we are talking about the produce of a vineyard, rather than two completely different types of land holdings. Again, arguments for widespread honey production falter on the complete absence of bees or apiculture in cuneiform records from the Jazīrah, especially when considered against the evident monetary value of bees and beehives emerging from Hittite law codes (6.9.2).

The Eastern Lower Town Palace assemblage yielded a small series of disbursement records (SZE Series 4, cf. Figure 6.35) concerning issues of syrup or honey (Sum. lal_3). It is worth noting here that two disbursements of vegetables, namely Vincente 1991, Text 131 and 145, includes issues of syrup or honey (Sum. lal_3) along with leek (Akk. *karšu*) and onion (Akk. *andahšu*) for the making of *mersu*-pastry, a type of cake that included oil and vegetables. Apart from deriving from the same archaeological context, the co-appearance of these resources in the same records suggests a managerial proximity also. Syrup and wine were, at Šehnā as elsewhere, oftentimes received together, as pointed to by Ismail 1991, Text 11, where the lord of Amaz brings a jar of wine (Sum. geštin) and three jars of syrup or honey (Sum. lal_3). Similarly, we can reasonably expect wine and syrup to have been stored in close proximity to each other (as observed by Vincente 1991, 322).

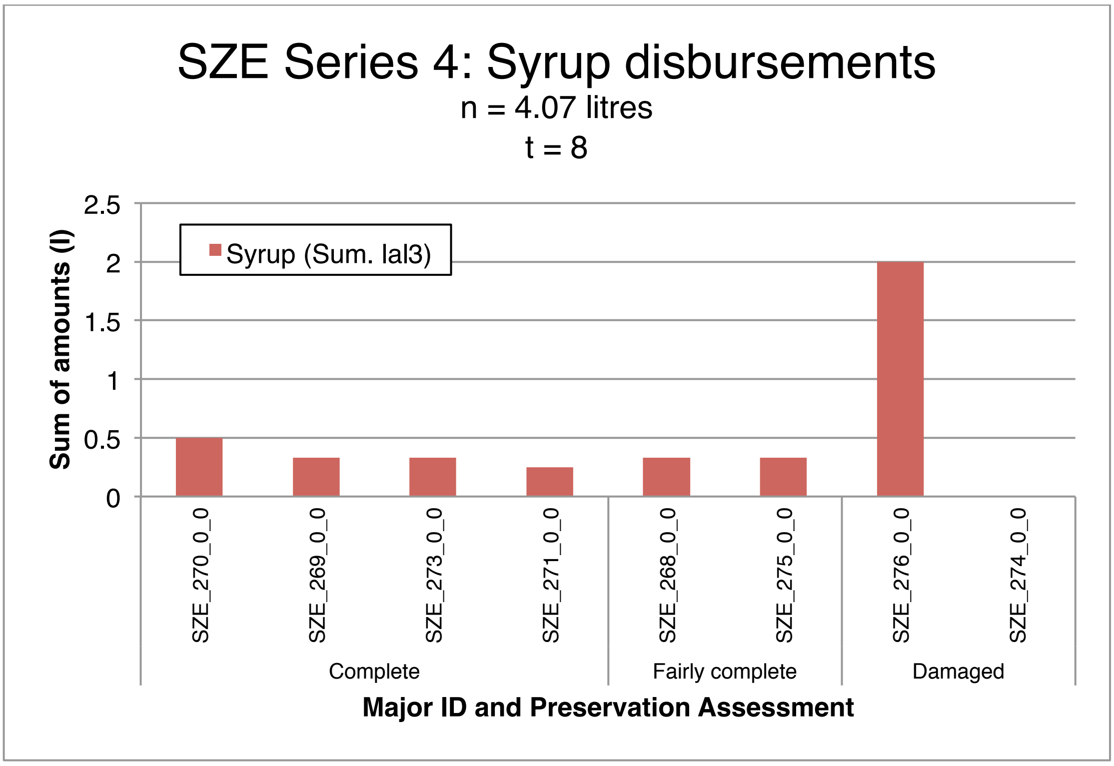


Figure 6.35: SZE Series 4: Sum of amounts (columns) by text and state of preservation (*qa*/litre ratio of 1:1)

6.9.2 Honey

Sum. lal$_3$ and Akk. *dišpu* are traditionally translated as 'honey', against which we should consider the absence of any reference to bees (Sum. nim-lal$_3$, Akk. *nūbtu*) in cuneiform sources prior to the 1st millennium BCE, except for attestations in lexical lists (CAD N/II *nūbtu*) (see Volk 1999, for a comprehensive discussion). Beeswax (Akk. *iškūru*) appears ephemerally in administrative sources from the Third Dynasty of Ur as an Akkadian loanword, suggesting the term to be of a foreign origin (Powell 1995, 103). Regulations on theft in the Laws of the Old Hittite Kingdom (ca. 1650-1500 BCE) alludes to beekeeping as a common practice in Anatolia (Hittite Laws §92, cf. Hoffner 1997, 228). Powell has suggested that beekeeping might have been prohibited by the short flowering season in the alluvial plain, but honey could surely have been found in the wild further north (Powell 1994, 99, corroborated by Volk 1999, 284).

The habitat of wild honeybees (*Apis mellifera* ssp.) today does not extend far beyond the foothills of the Zagros, the Taurus, and the mountains of western Bilād al-Šām (Ruttner 1988, 180). The earliest affirmative reference to beekeeping in Akkadian, found on a stela from 8th century BCE Babylon, underscores this point, as phrased by a governor of a district in the lower part of the Middle Euphrates Valley:

> "Bees (Akk. *habūbītu*) who collect honey (Sum. lal_3), which no one had seen nor brought down to the land of Suhum since (the time) of my forefathers – I had brought down from the mountains of the Habheans and installed in the orchards (Sum. giš-$kiri_6$) of the town of Gabbari-bānī." (Cavigneaux and Ismail 1990)

Archaeological evidence of Bronze Age apiculture is, quite understandably, extremely sparse, as bee-keeping leave few material traces, and the detection of honey is dependent on residue analysis (Tuberoso *et al.* 2009). The latter has demonstrated the use of honey as an additive in wine jars from Middle Bronze Age Tel Kabri close to the Mediterranean in northern Israel, and precedes the earliest archaeological evidence of bee-keeping in the Middle East by several centuries (Koh *et al.* 2014, 6). The finding of in situ beehives at 10th century BCE Tel Rehov in the Jordan Valley constitutes the earliest known archaeological example of honey production in the ancient world (Mazar and Panitz-Cohen 2007, 2008). These further resemble designs known from Egypt, where iconographic representations of beekeeping date as far back as the 25th century BCE (Serpico and White 2000, 409-411). Analysis of insect remains from the Rehov beehives indicates the species of bees in question to be the Anatolian honeybee (*Apis mellifera anatoliaca*) (Bloch *et al.* 2010). While not native to the regions around the Jordan, this subspecies is a more efficient honey producer than local populations such as the Syrian bee (*Apis mellifera syriaca*), and indicates import of selected bees from Anatolia to allow for large-scale honey production in urban environments (Bloch *et al.* 2010, 11243-11244, more extensively discussed in Simon 2014). The aforementioned inscription points towards similar long-distance imports, and equally implies local species of honeybees to be of limited use in honey production. In light of these observations, it remains uncertain if apiculture was extensively practiced in the Jazīrah and the southern alluvium during the Middle Bronze Age. The many references to Akkadian *dišpu* (or Sum. lal_3) coming from the region around Karkamiš could very likely refer to honey, yet the lack of references to bees or beekeeping (which, as we have seen, was not an industry too common to mention) means that organised production of honey in the Bronze Age Jazīrah and further south must be considered speculative at best.

6.9.3 Dates

The crop of the date palm (*Phoenix dactylifera*) contains on average c. 75% sugars, and played an unrivalled role in basic dietary inventories in the southern alluvium, also because of their substantial content of vitamins (Potts 1997, 69-70). Early versions of grilled floors for the extraction of date syrup are found in the Gulf dating as far back as the early 2nd millennium BCE, and could reasonably be expected to have spread further north (Højlund 1990). Several authors have observed that the date palm is unlikely to produce edible crop far beyond the alluvial plain, but it is hard to draw an exact line (Charles 1987, 1-2, Powell 2003, 17). Bronze Age texts from the Jazīrah make no mention of date in the context of local cultivation, but Arab geographers of the Middle Ages tell of date palm cultivation as far north as the town of Sinjar (Le Strange 1905, 98).

6.10 Wine

Wine is a beverage resulting from the fermentation and ageing of grape sap (Hornsey 2007, 1). Wine is produced from grapes, the crop of domesticated relatives of the wild grapevine (*Vitis vinifera sylvestris*) (on cultivation, see 7.2.6.3). Second to beer, wine constitutes one of the most important fermented beverages within the Bronze Age Mediterranean and the Ancient Near East, a situation equally reflected in the present dataset. Substantive assemblages of administrative records are relatively rare, but individual references to wine appear at most sites considered here, and the management and consumption of wine across the Jazīrah and adjoining regions during the Middle Bronze Age appears relatively common and widespread (a dated, but important classic is Lutz 1922, see now e.g. Frankel 1999, for principal and updated studies with reference to the cuneiform world e.g. Powell 1995, Zettler and Miller 1995, Miller 2008, Chambon 2009a, for Egypt, see the overview by Murray *et al.* 2000).

The sign for grapevine (Sum. geštin) appears in the earliest cuneiform texts from Uruk alongside other principal fruit crops, thus around c. 3000 BCE (Powell 1995, 100). But while viticulture and winemaking was widely known across the Tigris-Euphrates drainage from the beginning of the Bronze Age onward, it was not necessarily correspondingly widely practiced. Accounts on grape and wine are omnipresent, but there are no substantial references to the making of wine in the cuneiform record neither from the alluvium nor the Jazīrah (Powell 1995, 101, for corresponding archaeological observations see e.g. Zettler and Miller 1995, 131). Several authors have pointed to the predominance of beer as the beverage of choice in the southern alluvium, probably a result both of social tradition and environmental necessity (e.g. Zettler and Miller 1995, 123, Miller 2008, 944). In contrast, the dry-farming plains of the Jazīrah and the adjoining uplands constitute a transitory zone in this respect, well reflected both by the managerial records considered here and the extensive documentation for the trade in and consumption of wine at Mari on the Middle Euphrates (Chambon 2009a). It is more difficult than often assumed to identify wine in the cuneiform record, courtesy of the polyvalence of Sumerian geštin, which can mean both vine (often written $^{\text{giš}}$geštin), grape, grape juice, and wine (Powell 1995, 101). Akkadian *karānu* is not used in the administrative assemblages considered here. However, since wine is usually accounted for in pots (Sum. dug) in managerial accounts, it seems safe to assume that the resource in question is a liquid, though it must remain a qualified assumption if we are then talking grape juice or a fermented beverage.

6.10.1 Making wine

Ancient practices of winemaking are well documented in the case of Egypt. Here, the picking of ripe, domesticated grapes typically fell in late summer after the grain harvest (Murray *et al.* 2000, 585). In cooler regions, e.g. in Anatolia and mountainous regions of the Bilād al-Šām, vintage occurred slightly later, in September and October, and was marked by autumnal festivals of the vine (Gorny 1995, 148, Frankel 1999, 35-36) Following picking of the grapes, the harvested crop was pressed by treading in large vats or basins, and subsequently pressed to extract the remaining sap (Frankel 1999, 41-42). Treading floors or basins, though we would naturally expect them to be present in the Bronze Age archaeological record, are curiously absent in most regions, including Egypt (Murray *et al.* 2000, 586-588). The best examples come from Israel and adjoining parts of the southern Bilād al-Šām, (e.g. at Early Bronze Age Ta'nak, cf. Lapp 1969, 12-13 and Fig. 18, for a regional study, see Frankel 1999). While it may be due to less intense survey activity, Wilkinson notes that wine presses are much less common in Syria and Jordan (Wilkinson 2003, 57). Rock-cut wine presses are found primarily in the upper part of the Middle Euphrates and in the Taurus foothills, e.g. at Tall al-Sweyhat, where archaeological survey has documented several installations of a presumed Late Bronze Age date (Wilkinson 2004, 76-78).

In Egyptian practice, further pressing of grapes was undertaken with the aid of cloth or sacks. This process also served to filter out pieces of grape skin, seeds, and stalk fragments. Thereupon, the extracted must could be poured into ceramic containers, and subjected to fermentation. The exterior surface of the grape holds naturally occurring yeast cultures, and so the conversion of sugars into carbon dioxide and alcohol is initiated as soon as the grape breaks and the juice comes into contact with the exterior skin (Murray *et al.* 2000, 590, for an exhaustive discussion, see Hornsey 2007, 132-156). In antiquity, the fermentation process took place in multiple stages, which would last from six weeks to several months (Frankel 1999, 43 with further references). Assuming vintage in the first weeks of October, pressing and fermentation would, at the earliest, have been completed by December or early January, an important point to consider with regards to the assemblages discussed below.

6.10.2 Types of wine

There are virtually no specific qualifications of wine in the present dataset, whereas sources from Mari testifies to a very wide range of vintages, blends, and types of fortification, for example through the inclusion of honey, syrup, spices, and fruit (e.g. the discussion by Chambon 2009a, 4-10). The only explicit differentiation is between different vintages, namely old wine (Sum. geštin sumun) and new wine (Sum. geštin gibil), which appears in OBTR 266, and also in Ismail 1991, Text 30 dated to the 2[nd] day of Tamhiru, where the celebration of the *elunnu*-festival at Šehnā involved the consumption of 24 jars of new (Sum. gibil) and old (Sum. sumun) wine.

6.10.3 Transporting and storing wine

The above survey suggests that viticulture (the growing of grapes) was practiced in parts of the Jazīrah and in the Middle Euphrates and, with greater variation over time, in the south. Grapes have many qualities beyond their use for winemaking. Their use as sweeteners, for example in the form of grape syrup, was of equal importance throughout much of the Ancient Near East (illuminatingly discussed by Powell 1995, 103-107). Viniculture (the making of wine) was confined to areas further north and west, in upland regions that enjoyed higher levels of precipitation and available surface water. Sources from Mari point to the region around Karkamiš and the Aleppo hinterland as a primary source of wine, and also make occasional reference to locales along the Taurus foothills in the northern Khabūr Basin (Finet 1977, 122-125). The administrative records from Šehnā often give the origin of specific batches of wine, foremost of which is the town of Burullum, which must have been located closer to the Upper Tigris Valley further east (Ismail 1991, 42, also Charpin and Ziegler 2003, 273). More extensive references to grape cultivation along the anticlinal ranges east to the Tigris are largely lacking for the Middle Bronze Age cuneiform record, but there are tangible hints. Karanā, the name of the twin city of Qaṭṭarā and likely identical with Tall Hamirah further east in the 'Afār Plain, is a derivative of Akkadian *karānu*, which means 'grape' (Arabic khamīrah has similar affinities, cf. Nashef 1988, 39, also Powell 1995, 115). Tentative, though not unconvincing arguments for substantial local wine production at Šehnā has been made on the basis of the administrative documentation from the site (Vincente 1991, 305).

Given its potentially higher alcohol content and greater acidity, wine can be stored for considerably longer periods of time than beer (Hornsey 2007, 3-4), and therefore also transported over long distances. Trade in wine on the Middle Euphrates during the early 2nd millennium BCE is amply documented at Mari, but we should also note the regular receipt of wine jars from envoys or visiting lords in the Khabūr Basin, at Šehnā, as an indication that wine was heavily circulated, albeit in modest amounts (Powell 1995, 107). Wine was transported and kept in ceramic vessels, throughout the present dataset referred to with Sumerian dug. A whole plethora of containers could be associated with wine (as demonstrated for example in an Anatolian context, cf. Gorny 1995, 163 with further references). Based on an interpretation of the relative pricing of wine in the Karkamiš and Mari areas, Powell has suggested a capacity for the typical wine jar of c. 24 or 30 litres (Powell 1995, 110). Statistical analyses of actual pottery vessels would be extremely welcome in this regard, but no reliable body of material has yet been presented to address such questions. The recent unearthing of a wine cellar at the Middle Bronze Age palace of Tel Kabri in northwest Galilee offers a rare material counterpart to textual sources considered above. At the latter site, which extended over some 32 ha during the early 2nd millennium BCE, archaeologists have investigated a large *in situ* collection of storage jars, safely associated with wine trough organic residue analysis. The jars, counting some 40 uniform vessels, could contain an approximate 50 litres each, and seems to have been locally manufactured. In aggregate, these findings suggest an overall storage capacity of approximately 2,000 litres (Koh *et al.* 2014). The archaeological data from Tel Kabri mirrors storage practices emerging from the textual record considered here. Wine was stored in dedicated storage compartments, at Šehnā referred to as the 'sealed storage' (Akk. *bīt kunukki*) or the general storage (Akk. *nakkamtu*) (e.g. Ismail 1991, Text 14, 16, 22, and 24). The majority of wine disbursement records from Qaṭṭarā include issues to the king's cellar (Akk. *kanni šarri*) (e.g. OBTR 252-262 and 264), which receive regular and quite substantial numbers of wine jars. The latter assemblage suggests a primary storage from which issues for courtly consumption, e.g. the cellar (Akk. *kannu*), as well as for messengers and visitors, where disbursed.

Documentation on the receipt and management of wine within institutional households considered here can be considered on the basis of two substantial assemblages from the Eastern Lower Town Palace at Šehnā and from the household of Iltani at Qaṭṭarā. Receipts of wine (SZE Series 3) obtained from Room 22 in the Eastern Lower Town Palace account for a preserved total of 163 jars (Sum. dug) (Figure 6.36). Two outstanding entries account for the majority of the total amount, and deserve special mention; on the 6th day of Mammitu (mid-winter), Vincente 1991, Text 115 accounts for 32 jars of wine received on the occasion of the *nabrû*-festival. A little less than a fortnight later, on the 17th of the same month, Text 109 gives the receipt of 64 jars of wine on the occasion of the *elunnu*-festival. The timing of these receipts in conjunction with the timing for the picking, pressing, and fermentation of wine given above lends further support to Vincente's arguments for local wine production at Šehnā (Vincente 1991, 305). Apart from these two, deliveries of wine occur at a much more modest scale, occasionally amounting to five to ten jars, but mostly less.

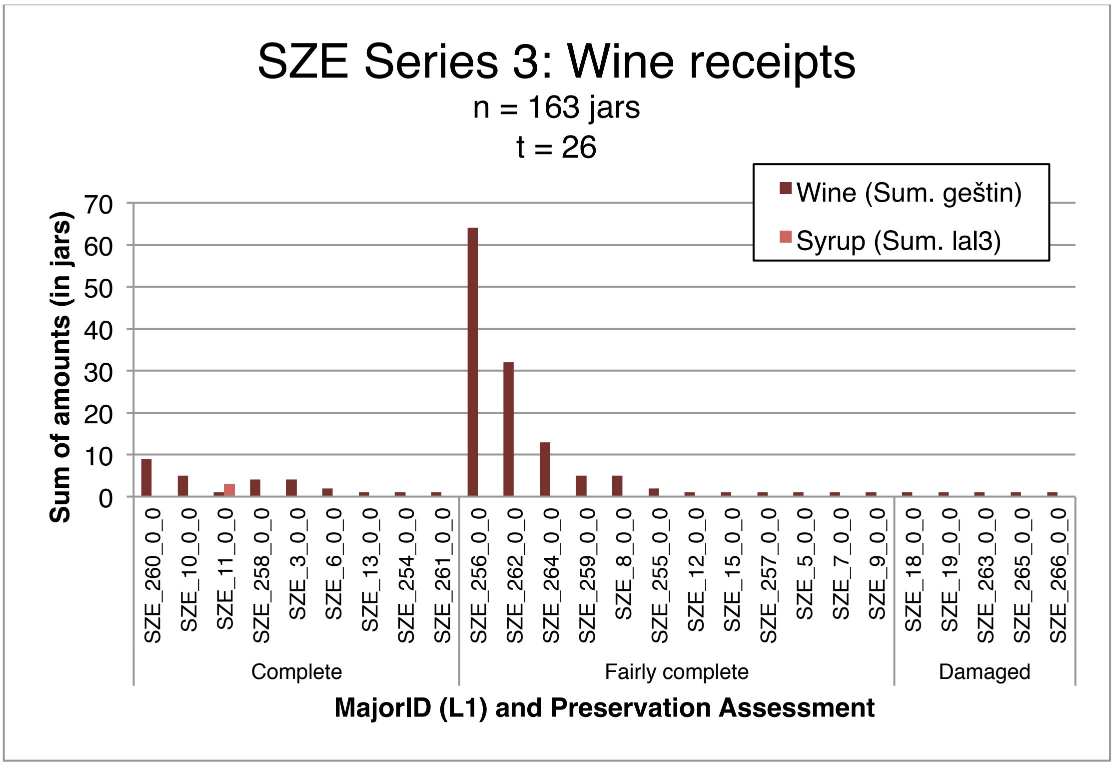


Figure 6.36: SZE Series 3: Sum of amounts (columns) by text and state of preservation (jar/*qa*/litre ratio unknown).

On average, if excluding the two receipts discussed above, gifts of wine brought from other locales would usually amount to one or two jars only (cf. Vincente 1991, 299-300). Wine was received from a host of different entities, though mainly lords (Sum. lu_2) of neighbouring settlements across the eastern and central Khabūr Basin. It is hard to ascertain the regularity and scale of incoming batches of wine from this assemblage, but given the apparent ceremonial nature of most receipts of wine, we should not expect deliveries to have been received on a daily basis.

The one identifiable receipt of wine from the household of Iltani at Qaṭṭarā is an extensive, albeit badly damaged account, which preserves numbers totalling 160 jars (Sum. dug) of wine deliveries (Sum. mu-du) in at least 15 different entries. The origin of these deliveries includes a variety of settlements and individuals, but the text is too badly preserved to offer any conclusive suggestions as to the nature of these receipts. The original total could have amounted to several hundred jars. The tablet was written out on a given day – the month name is not preserved – in the year of Ṣabrum (REL 218), which could suggest a special occasion. Wine disbursement records from the same archaeological context predominantly date to the 3rd and 4th month (i.e. early to mid-winter), and so the magnitude of these deliveries may be seen as directly related to the produce of the last vintage.

6.10.4 Wine consumption

The consumption of wine is, in terms of scale and social inclusivity, a practice of a much more exclusive social nature than the consumption of beer. The excavators of Tel Kabri interpret the unearthed wine cellar as aimed primarily at consumption related to the palatial court itself (Koh *et al.* 2014, 8), and a similar pattern emerges from the textual assemblages considered here. Compared to e.g. beer disbursements, the number of individual recipients of wine issues is very constricted, usually a few named persons. More common is the issue of wine for specific occasions, as seen regularly in the series of disbursement records from Šehnā, where the phrasing habitually qualifies issues of wine as given out 'on the occasion of the visit by so-and-so'. The wine dossier from the Eastern Lower Town Palace at Šehnā (SZE Dossier 4) includes a series of 65 disbursement records (SZE Series 2), concerned with an aggregate 123 jars (Sum. dug) in preserved entries (Figure 6.37). These are distributed across several years, with the bulk of the series dating to the year of Išme-El (REL 231). The majority of the texts relate issues of wine for royal consumption, commonly designated as drink for the king (Akk. *ana šatê šarri*). A smaller number of these records include issues to offerings (Sum. siskur$_2$) and chiefly to a variety of individuals and small groups appearing irregularly in the series. While we find occasional issues to other parties, notably visiting dignitaries and messengers, regular disbursements count a single jar of wine issued for the king.

The series of disbursement records from the household of Iltani at Qaṭṭarā numbers 11 tablets (OBTR 254-264). One, OBTR 263 is dated tentatively to REL 214, while the remainder of the series dates exclusively to the year of Ṣabrum (REL 218). Entries relate predominantly to a few named individuals, while the bulk of amounts issued goes to the king's cellar (Akk. *kannu*) (Figure 6.38). The emergent managerial infrastructure is very similar to that observed in issues of beer to the cellar at Ašnakkum (6.7.5). This means, however, that we can only speculate as to the ultimate recipients of these issues. Issues of wine to named individuals, among which are emissaries from Babylon and various towns in the dry-farming plains, predominantly count one jar (Sum. dug) per individual, but cannot provide us with much detail given our poor understanding of the exact amount in question.

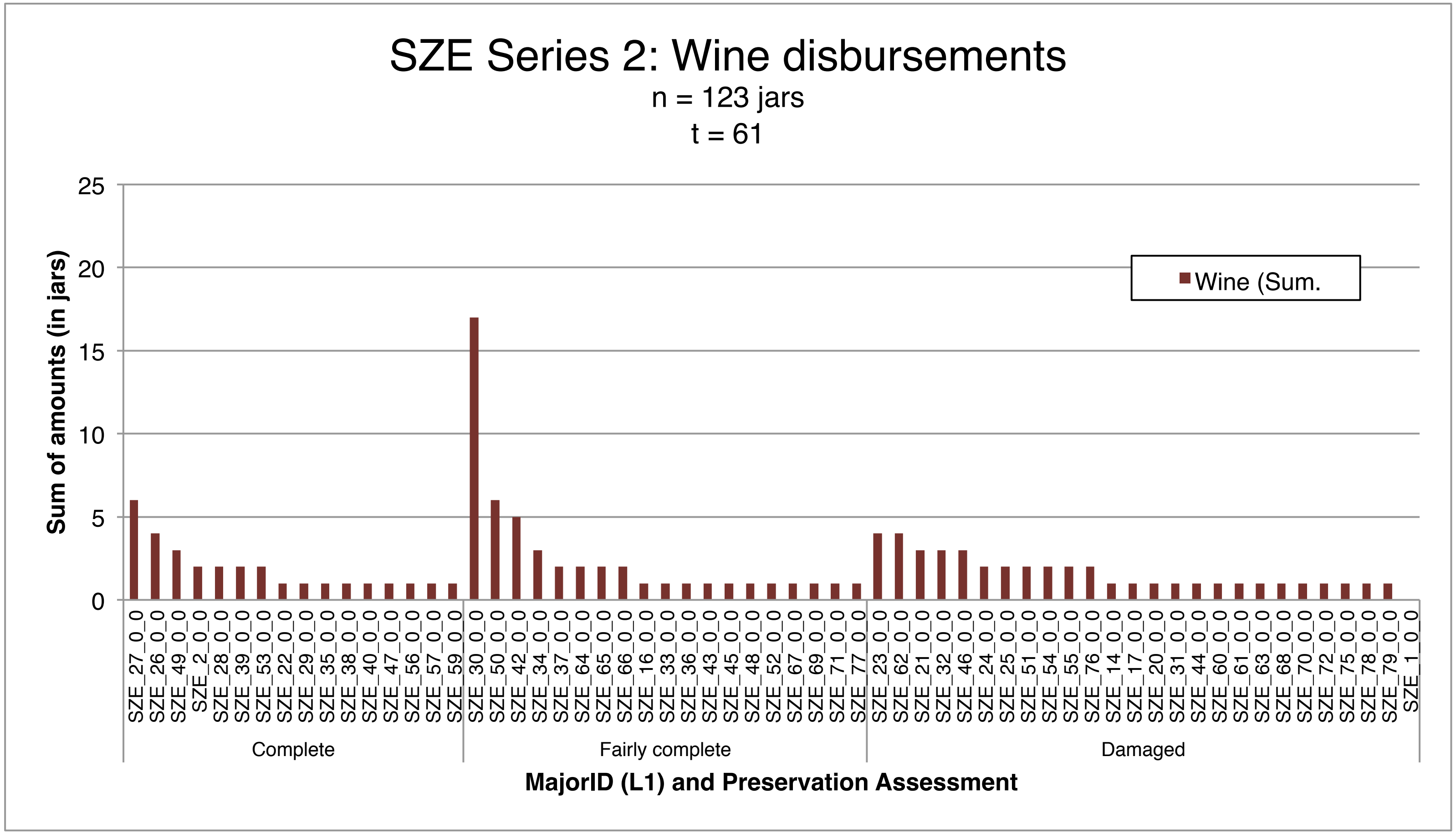


Figure 6.37: SZE Series 2: Sum of amounts (columns) by text and state of preservation (jar/*qa*/litre ratio unknown).

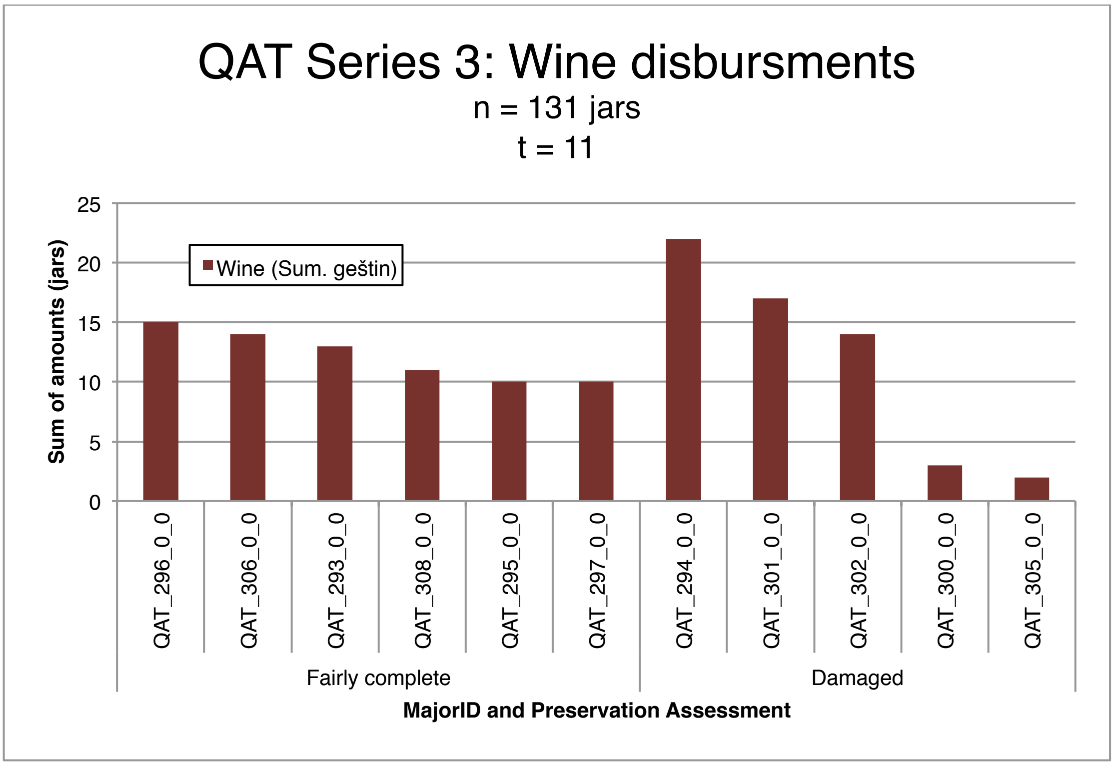


Figure 6.38: QAT Series 3: Sum of amounts (columns) by text and state of preservation (jar/*qa*/litre ratio unknown).

If we take a selection of the most extensively documented months from the disbursement accounts at Šehnā, e.g. the 7th, 8th, 10th, and 11th months of REL 231 and the 7th month of REL 240, we obtain an average of c. 20 jars issued per month, or 240 per year. While we cannot establish the absolute volume of Sumerian dug with any reasonable certainty, we can say that it should equal 10-30 litres, which translates the above into an unqualified 2,400-7,200 *qa* of wine consumed per year. This is little but a tentative estimate, yet it is worth stipulating that the frequency of wine distributions seems lower than that for beer, and so does not seem to support a notion of wine as issued on a daily basis. It further falls within a range reminiscent of the storage capacity seen at Tel Kabri. The sample from Qaṭṭarā, when subjected to the same analysis, yields much higher figures, namely 74 jars for the 3rd month and 43 for the 4th month of REL 218. The higher amounts disbursed may be due to the presence of an emissary of Hammurabi of Babylon, who was staying at Qaṭṭarā from the beginning of the 3rd to the beginning of the 4th month, and further a somewhat higher amount of named individuals and envoys appearing in the records. As with the series from Šehnā discussed above, the assemblage from Qaṭṭarā likewise falls in the early winter months at a time where we would expect a higher amount of wine to be circulated.

6.11 Either end of the table: infrastructures of subsistence

In the present chapter, I have analysed and discussed economic infrastructures pertaining to chief subsistence resources appearing in the managerial record. At this juncture, I wish to consider these individual cases in a comparative perspective, focusing specifically on the number of people encompassed by these infrastructures and the magnitude of resources passing through them. We will discuss production figures, principally in reference to grain, in the next chapter (7.8) and livestock holdings in the subsequent chapter (8.10). The overall scale of the institutional household economy is considered in the final part of the analysis (see Chapter 9).

The above analyses serve to provide the basis for a brief discussion of dietary regimes and nutritional requirements in light of the managerial infrastructures – the practices of processing, circulation, and consumption – of chief subsistence commodities. Starting with a review of benchmark nutritional requirements, I discussed the scale of consumption of grain, derived cereal products, e.g. flour and bread, beer, oil, fats, and sweeteners, and finally wine. Below, I point out some key implications of numbers emerging from this review, and highlight the need to differentiate between extensive and intensive subsistence infrastructures of the institutional household economy.

When we assume grain rations issued to cater for a diet comprising 65% cereals, some noteworthy constraints appear. If an adult male performing manual labour requires 3,900 kcal/day, then the average grain ration of 41.3 *qa*/month, or c. 3,300 kcal/day is more than enough to cover the estimated dietary component of 2,535 kcal cereals daily. The excess amount, of c. 770 kcal/day is, however, verging on the lower limit of required intake of an infant (at age 1-4 with an average cereal intake of 666.25 kcal/day), or a male (1,235 kcal/day) or female (1,137 kcal/day) child. It is wholly inadequate if turning to adolescent males (at 1,966.25 kcal/day) or females (at 1,641.25 kcal/day). The implication is that grain rations were issued not as an allotment to sustain the recipient and the eventual spouse and a couple of children, but the recipient only. This contention receives further support from the Ašnakkum ration records, where scribes account also for adolescents and sometimes children under the heading of an adult, complete with the amount allotted (see here the example given in my explanation of the text database structure, cf. 5.2.2). Yet the relative proportions of adults, adolescents, and children in all grain ration records surveyed here do not suggest a distributional pattern that included all minors related to the workforce supported by the institutional household, regardless of whether these were performing work or not. If the managerial infrastructure of the institutional household economy was indeed catering for "all members of the communal organization, whether sick, small, children or old people" (Sallaberger and Pruß 2015, 80), then the present dataset is, consistently, unable to detect it.

The number of people in receipt of grain rations is habitually taken as a reliable measure of institutional extent in studies on subsistence infrastructures emanating from the institutional household (discussed further in 10.2.1). Yet, if proceeding from the assertion advanced above, namely that grain rations were predominantly able to cover only very limited needs beyond basic nutritional requirements, then dietary regimes and associated infrastructures of subsistence are less easy to demarcate. As borne out e.g. in food allotments for messengers, dignitaries, and passing contingents of troops, a standard meal in the Bronze Age Jazīrah would include a measure of beer and one or half a measure of grain, flour, or bread. The documentation on oil and fat is, as discussed earlier, incoherent, and we can make no firm conclusion as to the possible wider distribution of oil rations (e.g. as the regular allotment discussed by Gelb 1965, 233-235) within the present dataset. Isolated numbers for harvested sesame indicate that sesame oil was one of the few resources apart from cereals that the institutional household economy was disbursing in bulk amounts (6.8.1), but there are no records of its regular disbursement to larger groups of people available here.

All of the basic subsistence resources in the Bronze Age diet appear also in the present dataset, but there are cogent socio-spatial divisions to observe with regards to the magnitude and extent of their respective managerial infrastructures, however, and these do not seem simply a function of a partial textual record. The observations advanced above for beer production and consumption may serve as a good reference point (6.7.6). As demonstrated, the scale of beer disbursements at Ašnakkum, Šehnā, and Qaṭṭarā align within a well-defined range from c. 20 and up to 60-70 individuals. In spite of the large sample of records on the production and disbursement of beer, it should be stressed that there are no references to regular large-scale brewing for recipients outside of the palace nucleus within the present dataset. Beer could be and evidently was brewed on a small scale in most average households in the Bronze Age Jazīrah (Zarnkow *et al.* 2006). At Ašnakkum, the above figure should be contrasted with grain disbursements issued for at least 250 and up to perhaps 550 persons on an annual basis, at least a 100 on average at Alalah, and at Qaṭṭarā at least 50 persons. The dataset is far from conclusive with regards to other subsistence staples, i.e. flour, bread, oil and fat, but data available for these resource groups compare with the infrastructural scale of beer production, not with the much larger extent of grain allotments. In short, there is no convergence between the scale of grain consumption on the one hand, and the consumption of processed subsistence resources, e.g. derived cereal products, beer, oil, sweeteners and wine on the other.

These discrepancies should be considered an expected caveat when examining a single body of cuneiform texts from a single site, but are less easily dismissed when traversing assemblages from six different locations. I offer a more forceful argument for the reliability of the dataset in this respect in my discussion of overall grain consumption figures later (cf. 9.1), but would venture here that the number of people encompassed by, and the scale of resource quantities appearing in, infrastructures of beer, flour, and bread consumption point to a social organisation more closely associated with the palatial household in isolation. Processed subsistence goods are issued either to members of the palatial nucleus or to messengers, visitors, or dependants who, courtesy of the nature of their work, were unable to process grain themselves (not a novel assertion, e.g. Gelb 1965, 238, Milano 1993a, 30-31). As I suggested in my discussion of milling capacity, the number of millers employed at Ašnakkum would, at best, be able to produce flour for some 250 persons at full capacity, yet the real output was probably considerably less. Beyond cereals and their derivatives, the managerial infrastructure of subsistence commodities becomes more forcefully associated with a more exclusive part of the palatial nucleus. Sweeteners and wine appear proximate to the head of the household and his or her immediate surroundings (similar arguments can be made for the occasional appearance of meat, fish, and a variety of fruits and vegetables, see Chapters 7 and 8).

Generally speaking, the dietary regime supported by the institutional household economy then illustrates both extensive and intensive infrastructures of subsistence distinguished by marked differences in terms of the number of people involved and the amount of resources processed and disbursed. In schematic terms (Figure 6.39), these can be associated with three distinct spheres of subsistence; the most intensive aspect of the economic infrastructure is bound to the palatial nucleus, and encompasses the circulation of processed and exotic subsistence resources, e.g.

bread, beer, fats, sweeteners, and wine (and also fruits, vegetables, meat and fish). At the intermediate range, we find a more extensive infrastructure concerned with the disbursement of resources from extensive cultivation practices, i.e. cereals and its derivatives, sesame oil, and perhaps legumes and meats on occasion. Most extensive in terms of the number of recipients and material magnitude is the management and disbursement of unprocessed cereals. Similar patterns emerge when turning to agricultural practices, the subject of the next chapter.

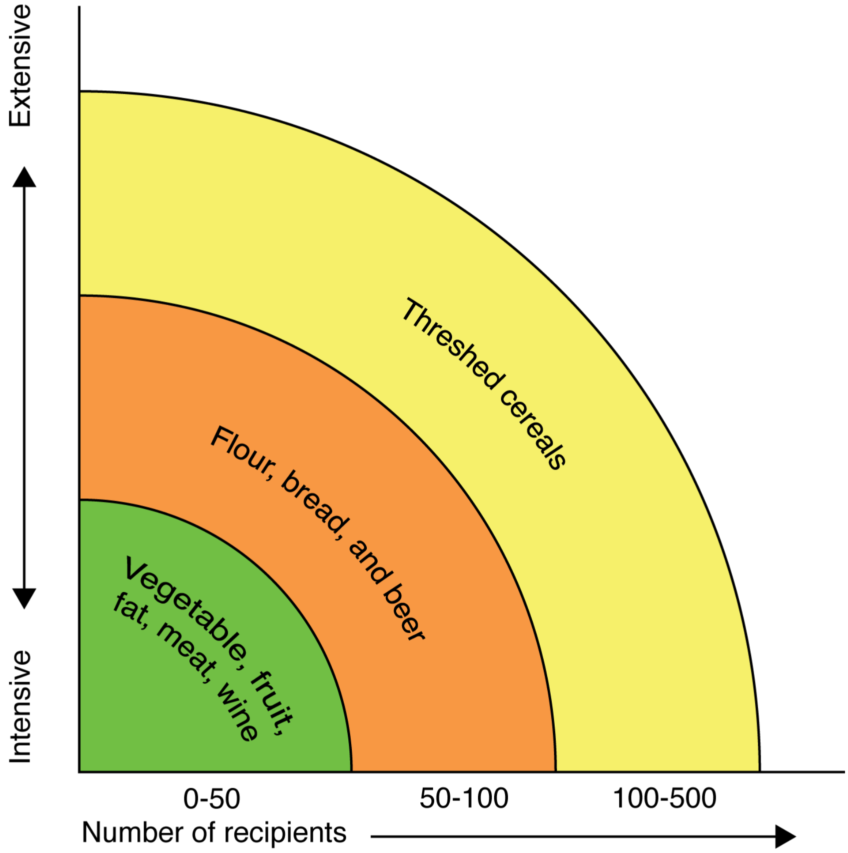


Figure 6.39: Schematic representation of spheres of subsistence within the institutional household economy

7 Agricultural regimes

The countryside, beyond the city gates and the urban setting of palaces, workshops, and storages, forms the basis for agricultural and horticultural production and the rearing of livestock. The present chapter surveys and discusses the principal elements of crop cultivation as these emerge from the dataset. Livestock management, which demonstrates different infrastructural characteristics, is the subject of the next chapter. I begin by sketching some fundamental aspects of environmental, institutional, and technological constraints on agricultural practice. I then turn to review principal crops under cultivation in the Bronze Age, drawing on archaeological, textual, botanical, and ethnographic sources. In the last sections, I discuss the social infrastructure of agriculture in more detail, through a review of practices related to field management, sowing, harvest, transport, and storage. Administrative cuneiform assemblages contained in the present dataset are overwhelmingly focused on cereals, in part through documentation on consumption (in the shape of grain ration disbursements, see 6.5) and, less regularly, through harvest accounts (see below). While I discuss the infrastructural characteristics of cereal production in the present chapter, an analysis of the overall scale of cereal production and consumption of individual households is reserved for later (9.1).

7.1 Rural institutions

The plains and piedmonts of the Jazīrah and the Bīlad al-Šām straddle a multitude of environmental zones (2.4). Traditions underpinning Bronze Age agriculture in these areas share a great many characteristics with agriculture in the alluvium, yet they also diverge on several points with regards to environmental, and consequently also social and economic variables (Jas 2000, 247). Irrigation, first of all, was a constrained and less significant contributor to crop production in the Jazīrah beyond the major river valleys (e.g at Late Bronze Age Nuzi, cf. Zaccagnini 1979, 109-113). In upland alluvial basins with higher levels of precipitation, access to surface water was a complementary, rather than a critical element of the agricultural regime. Then again, local ecological configurations run across simple geographical divisions. In the 'Afār Plain around Qaṭṭarā, streams emanating from aquifers in the anticlinal ranges formed the basis for intensified agricultural activity, and were a subject of managerial interest (van Driel 2000a, 291). Cereal cultivation in arid sectors of the Balīkh and Middle Euphrates valleys, at Tuttul and at Mari, would have required a sustained supply of surface water, in turn demanding dedicated communal effort to construct and maintain irrigation channels (and institutional oversight, as discussed with reference to Tuttul by Villard 1987). Logistics, and the relative proximity of a variety of ecological niches and economic regimes, bound together a diversified range of crop producers spread across the wider region, signified for example by extensive overland and riverine trade (Wilkinson 2000c, 6-14).

7.1.1 Villages and communities

The plains of the Middle Bronze Age Jazīrah and the more diversified piedmont regions to its east and west, were characterised by scatters of predominantly small hamlets and villages (<5 ha), with occasional towns (5-20 ha) and, more rarely, cities (>20 ha) (Wilkinson *et al.* 2013c, 46-50). The social infrastructure of agriculture revolved around the smaller rural communities, and while details of their everyday place within the social landscape are alluded to only haphazardly in the cuneiform record (cf. important comments by van Driel 2001, 112), archaeological perspectives should warn us against viewing them as static and docile elements of a world steered by urban polities (Richardson 2007, 13-18, consider the illuminating conceptual discussion given by Porter 2013, 1-12). The cumulative magnitude of man-power and resources vested in the rural hinterland communities comes into sharp focus at times of increased agricultural activity, for example in preparations for the harvest, which often saw a heightened need for cooperation between institutional economies and local communities (7.5). In the Zagros upland around Šušarrā, administrative receipts on harvested cereals and legumes shine a rare light on a plethora of small rural settlements in the surrounding basin, and the transportation of the harvest to a select handful of villages where cereals were threshed and accounts settled (as seen also at Mari, cf. van Koppen 2001, 463-464).

7.1.2 Fields and orchards

The typical model of dry-farming communities in the Bronze Age Ancient Near East conceives of highly nucleated towns and villages set within concentric zones of, first, intensively cultivated orchards, fields, and garden plots, followed by cereal fields with, perhaps, some degree of manuring, and finally outer field plots more regularly subjected to biannual fallow (e.g. Wilkinson 2003, 109-111 and 118-123, also Widell *et al.* 2013a, 62-66). This framework reflects conclusions arising from textual sources, e.g. the pioneering study of land use around Late Bronze Age Nuzi close to modern-day Kirkuk (Zaccagnini 1979, 155-161). Cuneiform texts agree to a certain extent with statistical models. Hunt's projected minimum of 2.4 ha for a small household (Hunt 1987, 166) is echoed for the alluvium by Early Dynastic field plot sizes discussed by Liverani (drawing on Selz 1993, cf. Liverani 1996, 17 and Fig. 19). There, the field plot of the average worker generally extends over 1-6 *ikû*, translating into 0.35 to 2.15 hectares. A similar size distribution emerges from a fragmentary field list from Qaṭṭarā (OBTR 322, cf. Figure 7.40), dating to the latter half of the 18th century BCE (discussed also by van Driel 2000a, 291, for similar observations on the Mari documentation, see Mori 2007, 48-49).

Pastoral sectors, which we will discuss in greater detail in the following chapter, intersected with sedentary networks in multiple ways. Sheep and goat could pasture on the stubble of harvested fields, on failed crops, and on fallow land, as seen in the region also today (Wilkinson and Hritz 2013, 26-27, for an informative account of similar strategies in Greece, see Halstead 2014, 191-199). The point to stress here is that we should view the agricultural activity of the institutional household as nested within a more complex web of local and regional economic infrastructures, interacting both with rural communities and passing herders and their flocks from further afield (van Driel 2000a, 266-267, Guichard 2014).

7.1.1 Land usage and ownership

General overviews of Bronze Age agricultural practice and land tenure often take legal frameworks, i.e. property rights, as their basis for discussion (e.g. Renger 1995, 269-271). Within this framework, the agricultural economy is commonly divided between public or institutional, communal, and private landholdings, with discussions tending towards assessing the relative power of these sectors in any one historical period (Liverani 2005, 50-52). The agency of early political organisations – and it is their account of things that we are left with for much of the Bronze Age – tend to erase many an entangled node of community, tribe, kin, and harsh practical reality that must have weighed heavily on the infrastructure of agriculture (Richardson 2007, 28-29). A recent study of institutional household land holdings in the Amuq has contributed to a growing body of literature that sees political economies – and their material infrastructure – as a much more dispersed and dynamic set of interrelations with local and regional networks (Lauinger 2015, 187-199, cf. also, with reference to Šehnā, Ristvet 2008). While formal structures are, by their very nature, simplifying and convincing heuristic tools, we have to accommodate for a broader variety of social networks, local power hubs, and political organisations as active elements of the social landscape (Seri 2005, 188-192).

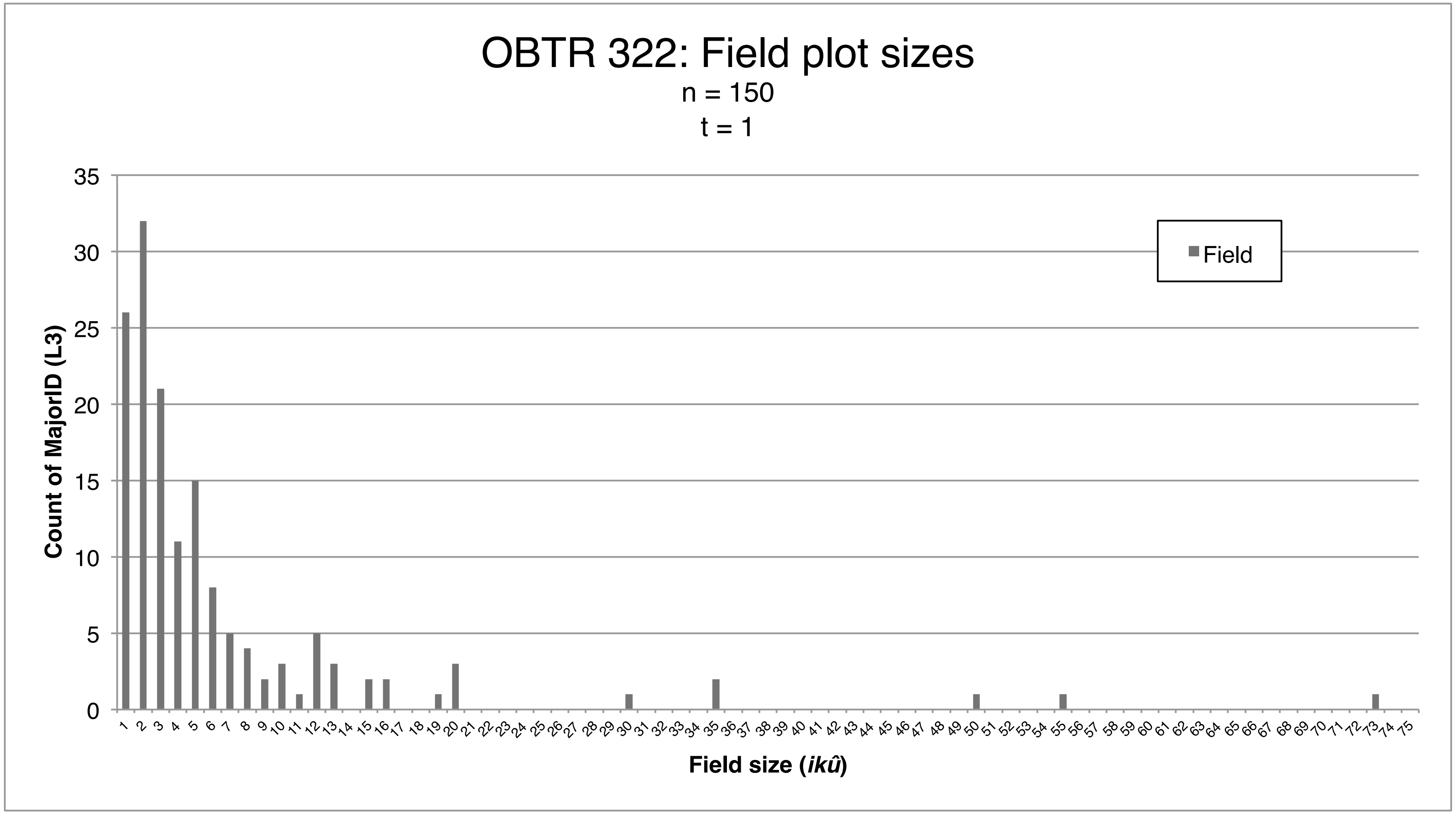


Figure 7.40: OBTR 322: Field plot sizes at Qaṭṭarā and associated settlements

Particular elements of the agricultural landscape were, in the Bronze Age Ancient Near East as elsewhere in pre-capitalist land use practices, subject to use that could transcend rigid notions of ownership (see for a concise, but thoughtful outline of property within a communal social frame Bromley 1992, 3-4, also Runge 1992). River meadows as well as the dry steppe were common resources, used for pasture, fishing, and fowling (Durand 1998, 513-515, also Mori 2007, 41-42). Forests and reed thickets, while only more widespread in the northern part of the study region, likely constituted another communal source of resource exploitation, and hunting of larger mammals, e.g. boar, gazelle or fallow deer should logically be expected, even though they largely escape textual sources (faunal samples from Late Bronze Age Alalah form a good example, cf. Çakirlar and Rossel 2010).

Cultivated fields and orchards, in contrast, reflect private and institutional property rights. While tilling, sowing, and harvesting the fields may logically have been a communally founded effort, the individual ownership of fields is well attested in the Middle Bronze Age alongside the holdings of the institutions, or palaces (Durand 1998, 521-524, van Koppen 2001, 459-460). But while the distinction between agricultural land owned by individuals or communities and agricultural lands owned by institutional organisations is an important one, it appears but rarely as a variable in the administrative documentation (10.4.2). Livestock is equally difficult to assign to specific legal structures of usage and ownership, and I demonstrate later that the composition of herds often traversed multiple spheres of ownership for very practical reasons (8.10).

7.1.2 Agricultural cycles

To properly contextualise agricultural resources emerging from the textual record, let us first define the chief elements of the annual agricultural cycle (Figure 7.41). Most historical reconstructions of the agricultural year have revolved around practices on the alluvial plain (e.g. Landsberger 1949, Hruška 1990, LaPlaca and Powell 1990, Widell *et al.* 2013b, 86-89). Bi-annual fallow of fields appears to have been the norm in the latter area (Yamamoto 1979, 1980), and is commonly regarded as practiced in the north also, at least for later periods (see for Late Bronze Age Nuzi Zaccagnini 1979, 31, also Postgate 1988, 144, for comments regarding the Middle Bronze Age, consider van Driel 2000a, 287).

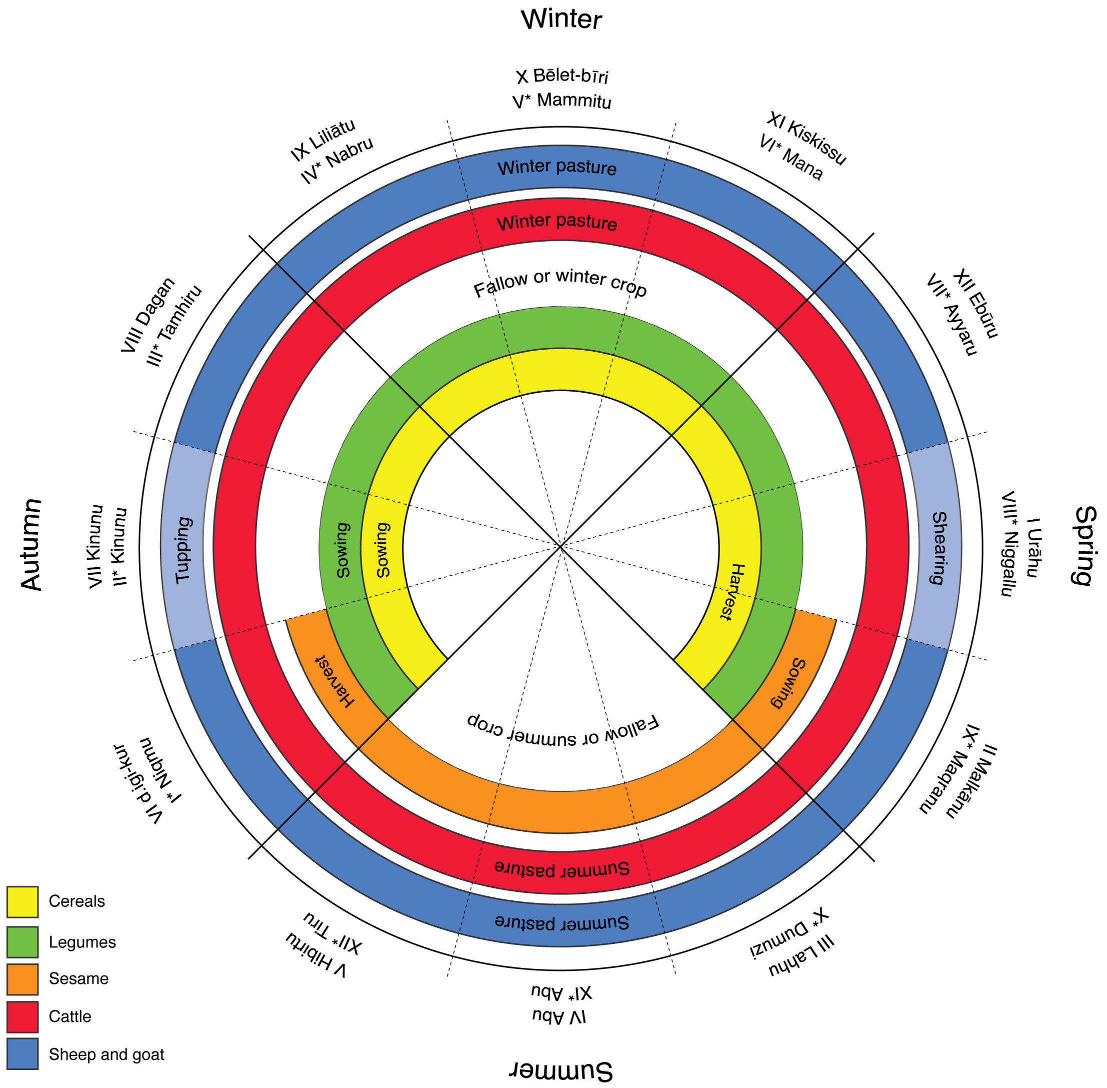


Figure 7.41: Schematic representation of the Middle Bronze Age agricultural year in the Jazīrah

Weeding, hoeing, and ploughing of the fields in preparation for the sowing of barley and, somewhat later, wheat, was undertaken in the beginning of the autumn (cf. van Driel 2000a, 290, Mori 2007, 44-45). The cultivation of legume crops is rather poorly documented in the cuneiform record, but these were likely grown in moister parts of the plain, perhaps in partial rotation with cereal crops (consider also Widell *et al.* 2013b, 90). After sowing, there followed a period of relative inactivity in field management lasting until early spring, in which the main tasks consisted in protecting the fields from pests and animals, e.g. birds and gazelles (Wasserman 1999). The harvest of cereals sown in the autumn took place in mid-spring (van Driel 2000a, 290). Being a summer crop, sesame complemented cereal production. The threshing of cereals in the Middle Euphrates Valley in late spring coincided with the sowing of sesame (as seen in ARM 27, 38), and the uprooting of sesame in early autumn was followed by ploughing and sowing of barley and wheat (Mori 2007, 45-46). Millet, while not appearing in Middle Bronze Age texts, is attested as a summer crop alongside sesame in Middle Assyrian times (Postgate 2013, 348). Other types of produce, notably fruit crops, followed different trajectories of growth and ripening. The crop of a number of temperate shrubs and trees ripen in late summer and early autumn, e.g. fig (September-October), grape (October-November), olive (October-December), and pomegranate (October-January). Garden crops, e.g. onions, cucurbits, and salads can be harvested on various occasions, and are less easy to accurately integrate into an annual cycle. Interwoven in the recurring tasks of ploughing, sowing, and reaping were the passing of livestock from winter to summer pastures, shearing, mating, and culling. I discuss these matters in more detail in the next chapter, but it is important to consider the intersections between management of agriculture and livestock, e.g. the close association of shearing and harvesting, which would have made for three months of intensive work in late spring and early summer.

7.2 Crops

In the following sections, I consider the individual cultivars appearing in the data set and their use within agricultural regimes across the study region. In line with the analytical perspective laid out in the last chapter, the aim is firstly to integrate and assess textual, archaeological, and biological data, secondly to evaluate the use of these crops within Middle Bronze Age agricultural practice. I review first the cereals, notably barley, emmer, and wheat, secondly legumes, which, though often only summarily treated next to chief cereal cultivars represent an important component of past dietary regimes. Thirdly, I discuss sesame and its potential use within mixed cultivation practices. Though there are no references to the cultivation of flax in our dataset, I briefly outline and consider the potential contribution of flax cultivation within the wider region also. Fourthly, I discuss the relevance of vegetable, fruit and nut crops along with their regional distribution. Apart from cereals and, in certain areas, legumes, most of these crops are poorly documented in the textual assemblages considered here, and technological constraints may have limited their large-scale cultivation.

7.2.1 Cereals

The most important cultivars within agricultural regimes of the Bronze Age Ancient Near East are the cereals, especially species of barley and wheat. These are annual grasses (family *Poaceae*), cultivated for their starchy seeds and straw. Taxa such as wheat and rye further contain a substantial amount of protein, though far from that obtainable from legume crops. There are three dominant species of cereal crops in the cuneiform record in general (and in the present dataset, cf. Table 7.29), namely barley (Sum. še, Akk. *še'u* or *u'u*), emmer (Sum. ziz$_2$, Akk. *kunāšu*), and free-threshing wheat (Sum. gig, Akk. *kibtu*) (Powell 1984b, 49-58, Potts 1997, 57-62). Barley was by far the prevalent staple crop in the Jazīrah as well as in the alluvial plain, with emmer and wheat forming a considerably smaller complement. In the Middle Bronze Age, emmer occurs in larger quantities in areas of higher rainfall, especially in the documentation from Alalah in the Amuq and from Šušarrā in the Zagros piedmont, while an overall decrease in importance relative to barley can be observed in the Jazīrah from the Early to Middle Bronze Age (Riehl *et al.* 2012). The southern alluvium demonstrates a more consistent and pronounced preference for barley, with studies of agricultural regimes during the Third Dynasty of Ur suggesting as much as 98% of farmland grown with barley (Maekawa 1984, 81). Localised access to surface water in arid regions, e.g. in the Balīkh, could stimulate increased wheat cultivation in some periods (van Zeist and Bottema 1999, 31 and Fig. 36).

Data Type	Detail Data Type	Description
Botanical (Reference)	Grain (Sum. še)	Generic for cereals, but generally assumed to be barley (*Hordeum* sp.) where nothing argues against it. The qualifiers 'new' and 'old' serve to distinguish yields from separate years. 'Bread' and 'beer' grain appears to refer to use rather than species.
	Grain (Akk. *burru*)	
	New grain (Sum. še-gibil)(TUT)	
	Old grain (Sum. še-sumun)	
	Bread grain (Sum. še-ninda)(ASZ)	
	Beer grain (Sum. še-kaš)	
	Barley (Sum. še)	Barley (*Hordeum vulgare*). Distinguished from 'grain' when appearing in texts alongside wheat or emmer. The qualifiers 'white' and 'black' (or 'bright' and 'dark') may distinguish between husked and dehusked grains.
	Black barley (Sum. še-giggi)	
	White barley (Sum. še-babbar)	
	Emmer (Sum. ziz2)	Emmer (*Triticum dicoccum*). The qualifier 'white' (or 'bright') may refer to dehusked grains.
	White emmer (Sum. ziz2-babbar)(ALA)	
	Wheat (Sum. gig)	Free-threshing wheat (*Triticum aestivum*).

Table 7.29: Detail Data Types for cereals

7.2.1.1 Barley

Barley (*Hordeum vulgare*) is the principal cereal cultivar of the Ancient Near East and a founder crop of Neolithic agriculture. Wild relatives are found throughout the eastern Mediterranean basin, across the plains and hilly flanks of the Tigris-Euphrates, on the Iranian plateau and in parts of Central Asia (Zohary *et al.* 2012, 53-54). In Bronze Age agriculture, we find two specific varieties, namely 2-row (*Hordeum vulgare* ssp. *distichum*) and 6-row (*Hordeum vulgare* ssp. *vulgare* or *hexastichum*) barley, distinguished through the number of fertile florets on each spikelet (Charles 1984, 27-30). For the Early and Middle Bronze Ages, we can observe a rough division in practices of barley cultivation between upland dry-farming areas, where 2-row barley is predominant, and the alluvial plain, where 6-row barley is the norm (Charles 1984, 27, Potts 1997, 57-58). Though less prized than wheat for human consumption, barley fares better in drier conditions and poorer soils, and is able to withstand increased levels of soil salinity. It furthermore plays an important role as the main component in beer brewing, which, as we have already seen, provided an important complement to everyday diet (6.7). Barley is securely associated with Sumerian še and Akkadian *še'u* or *uttetu*. The bivalence of Akkadian *še'u*, which was also used as a generic term for grain, often complicates secure identification in textual sources (Powell 1984b, 49-51), a problem also encountered in the present dataset. Though often considered the principal cereal due to its high salt tolerance, its extensive use also in the dry-farming plains may be related to its superior area-yield compared to other species (Powell 1985, Widell *et al.* 2013b, 85).

7.2.1.2 Emmer

The various species of wheat can be classified according to their chromosome profile, but also according to their glume arrangement, namely the degree to which the ripe grain is easily separated from the glume upon harvesting (Charles 1984, 21-27). Glume wheats, among others hulled emmer (*Triticum dicoccum*), maintain their glume casing under threshing, and require additional processing in order to fully separate the grain from the spikelet remains. Free-threshing wheats, especially naked bread wheat (*Triticum aestivum*), in contrast, will fully separate the grain from the glume under threshing. Following threshing and winnowing, the two varieties therefore present very different products, the glume wheat essentially still in spikelet form and the free-threshing wheat the naked grain only. Though the actual crop may be very similar, this explains the distinction between glume and free-threshing wheat often observed in antiquity (Zohary *et al.* 2012, 24). The hulled variety, through its frequent appearance in the archaeobotanical record thought to be emmer (*Triticum dicoccum*), is commonly associated with Sumerian ziz_2, Akkadian *kunāšu* or *zīzu* (Powell 1984b, 51-56). Hulled emmer is one of the main cereal cultivars in the 3rd millennium BCE Jazīrah, but declines significantly relative to barley during the 2nd millennium BCE (Riehl *et al.* 2012, 126, Widell *et al.* 2013b), at least in the dry-farming plains. Wheat crops are, in general, less tolerant towards arid environments and require comparatively higher levels of precipitation compared to barley. As we shall see later, the Middle Bronze Age picture is less conclusive for regions with higher annual rainfall. Wheat is superior to barley with regards to nutritional value, owing to its higher content of gluten protein, a trait that further makes wheat excellent for making leavened bread (Zohary *et al.* 2012, 23).

7.2.1.3 Bread wheat

Bread wheat (*Triticum aestivum*) is the most widespread and most important cereal crop in use in the world today. Domesticated forms of the free-threshing variety appear at a relatively early date, though later than hulled cultivars such as emmer and barley. As a free-threshing variety of wheat, this crop requires no further processing following threshing. Despite the lesser demands in terms of overall labour input, free-threshing wheat only came to replace hulled relatives gradually and relatively late in the Nile Valley and the Euphrates-Tigris drainage (Potts 1997, 61, Zohary *et al.* 2012, 46-47). Bread wheat is associated with Sumerian gig, Akkadian *kibtu*, and the quantitatively least significant of the main cereal crops attested in the cuneiform record (Powell 1984b, 56-58).

7.2.1.4 Relative proportions of cereal cultivation

The relative frequency of barley, glume and free-threshing wheat cultivars offers important insights on agricultural practices, and can be deduced from a variety of sources. Studies on cuneiform assemblages from 15th century BCE Nuzi in the plains near Kirkuk asserts a ratio of 4.5:1 between barley versus emmer and bread wheat combined (Zaccagnini 1975, 217), but comparative data from the Middle Bronze Age Jazīrah and further afield is lacking (Widell *et al.* 2013b, 84). The present dataset demonstrates clear differences in the ratio of staple cultivars between sites in the dry-farming plains, namely Tuttul, Ašnakkum, and Qaṭṭarā, and in areas of higher rainfall, e.g. Šušarrā and Alalah (the documentation from Šehnā is of limited relevance here). Only a handful of references to wheat crops appear at the former group of sites, and these deal invariably with small amounts. For Alalah, let us consider the compiled series of dated grain disbursements, i.e. ALA Series 1, 2, and 3. Table 7.30 below offers an overview of principal crops listed in these 28 documents and distributed according to the year series reconstructed by Zeeb (2001, 183). Of course, this concerns patterns of consumption rather than production, but we may take it as a rough approximation of the ratio of staple crops at hand.

Year	Total (*qa*)	Barley	Emmer	Vetch	Ratio
Year A	87,728	65.22%	23%	11.78%	6:2:1
Year B	191,808	59.52%	29.9%	10.57%	6:3:1
Year C	109,891	56.53%	26.36%	17.10%	4:2:1

Table 7.30: ALA Dossier 1: Proportions of barley, emmer, and bitter vetch

If focusing on barley and emmer alone, these figures echo the 2:1 relationship between barley and wheat cultivars observable some eight centuries earlier at Tall Baydar (ca. 2400 BCE) (Widell 2003, 725-726). For Šušarrā, we should consider a dossier of harvest records discussed by Eidem (1992, 27-32). Considering this batch indicative of the ratio of cultivated crops for a given year is not without problems, however. Administrative documents from the site lack date formulas (9.2.2), a feature that significantly hampers temporal ordering. Assuming the intricate reconstruction of historical events provided by Eidem to be correct, we can assume the administrative assemblage from the site to be contained within a very narrow timeframe, and arguably within a period of less than two years (Eidem 1992, 44-45, Eidem and Læssøe 2001, 16-19). Figure 7.42 below outlines the major groups of cereals and pulses found in preserved entries in this dossier, and clearly illustrates a more pronounced reliance on wheat crops, peas, and lentils.

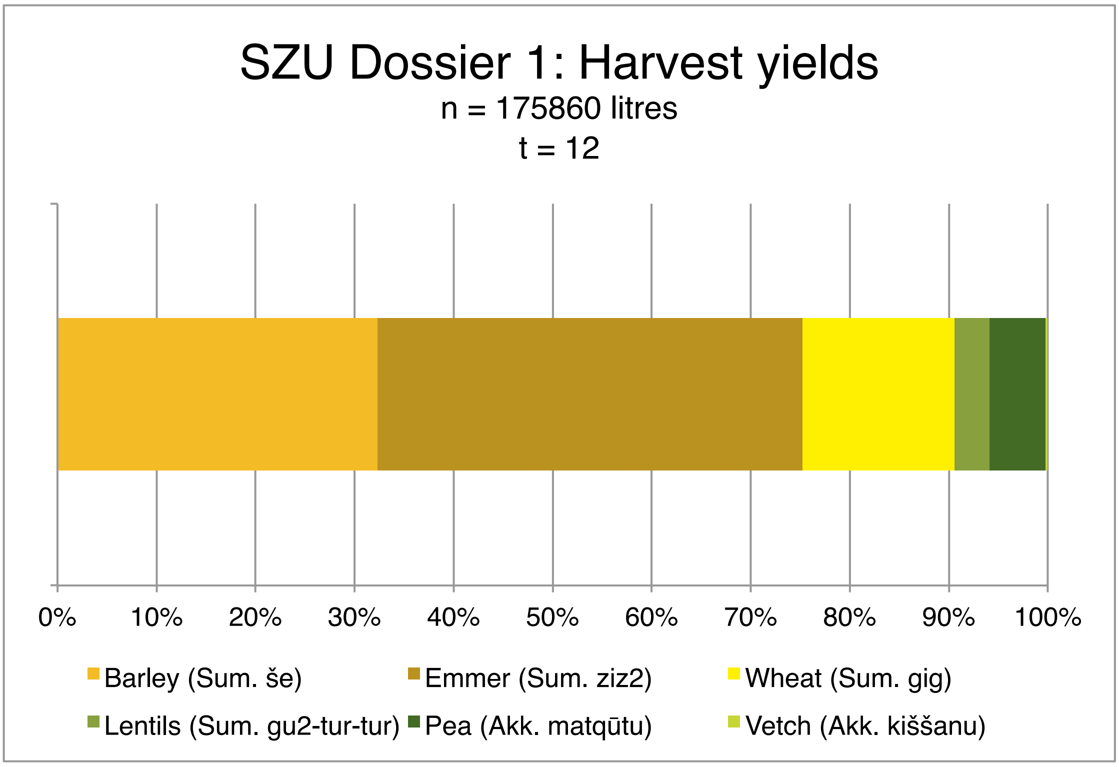


Figure 7.42: SZU Dossier 1: Relative proportion of cereal and legume types in harvest records (*qa*/litre ratio of 1:1)

7.2.2 Legumes

Cultivated species of the family *Fabacea* syn. *Leguminosae* constitute a diverse group of annual shrubs and herbaceous plants grown mainly for their nutritious seeds. These form an important, though often overlooked complement to cereals in the human diet (Gallant 1991, 72-75, Garnsey 1999, 15). Their high protein content makes legumes an important substitute for meat, while the ability of leguminous plants to fix and transfer atmospheric nitrogen to the soil preserves overall soil fertility (Zohary *et al.* 2012, 75). For the latter reason, mixed or rotating cultivation of legumes and cereals improves the overall productivity of agricultural lands (see e.g. Maekawa 1985, for examples of this practice in the Early Bronze Age alluvium).

The primary leguminous crops cultivated in the Bronze Age were lentil (*Lens culinaris*), pea (*Pisum sativum*), broad or faba bean (*Vicia faba*), chickpea (*Cicer arietinum*), bitter vetch and common vetch (*Vicia ervilla* and *Vicia sativa*) and grass pea or chickling vetch (*Lathyrus sativus*) (Renfrew 1985b, Zohary *et al.* 2012, 75-77). The latter three are grown primarily as fodder crops, and possible cognates appear as such also in textual records considered here. The correct identification of individual species with types of legumes mentioned in the cuneiform corpus remains cumbersome (Powell 2003, 21). Research on texts from Šušarrā and relatable archaeological evidence from elsewhere in the Rānīah Plain suggest broad bean (*Vicia faba*) to be associated with Sum. gu$_2$-gal, lentil (*Lens culinaris*) to be Sum. gu$_2$-tur, while Akk. *appānu* would then be chickpea (*Cicer arietinum*) (Eidem 1985, also Helbæk 1963). The latter is etymologically related to the modern Hebrew word for chickpea, *āphun* (with the similar meaning 'nosey', cf. Stol 1985, 129;Dalman 1928-42, Vol. II 271). These observations are based mainly on two sowing records from Šušarrā (Sh II 6 and 14), which list a total five varieties of legumes; Akk. *matqūtu*, Akk. *appānu*, Sum. gu$_2$-gal, Sum. gu$_2$-tur, and Akk. *kiššanu*.

The identification of chickpea especially has been debated, with earlier discussions linking it to Sum. gu$_2$-gal ('large pulse'), even though the regular appearance of this term in cuneiform texts from the alluvial plain, in an environment inhospitable to chickpeas, would seem to disqualify such an identification (Charles 1985, 44, Powell 2003, 21). Eidem's association of chickpea with Akk. *appānu*, a term amply documented at Šušarrā where annual rainfall exceeds 400 mm, seems more reasonable in this light. If chickpea is not to be associated with Sum. gu$_2$-gal, the latter term may then be related to the broad bean, while Akk. *matqūtu* can be tentatively understood as referring to the common pea. Akk. *kiššanu* and its Sumerian cognate zi-aš should, for reasons given below, be associated with bitter vetch or, depending on local variation, common vetch or grass pea.

Data Type	Detail Data Type	Description
Botanical (Reference)	Chickpea (Akk. *appānu*)	Chickpea (*Cicer arietinum*).
	Chickpea (Sum. gu2-gal)	
	Lentils (Sum. gu2-tur-tur)	Lentil (*Lens culinaris*)
	Pea (Akk. *matqūtu*)[SZU]	Pea (*Pisum sativum*)
	Broad bean (Sum. gu2-gal)	Broad bean (*Vicia faba*)
	Vetch (Akk. *kiššanu*)	Likely bitter vetch (*Vicia ervilia*) but could equally be associated with common vetch (*Vicia sativa*) or grass pea (*Lathyrus sativus*).
	Vetch (Sum. zi-aš)[ALA]	

Table 7.31: Detail Data Types for legumes

Textual attestations of pulse crops (Table 7.31) are distributed irregularly across our study area, and we should briefly discuss the possible reasons for this inconsistency. References to bulk amounts of legumes derive exclusively from

Alalah and Šušarrā, two sites located in areas with markedly higher levels of annual precipitation. For the Middle Bronze Age, archaeobotanical evidence testifies to the presence of a fair selection of legume staples at sites across the dry-farming plains, yet predominantly in amounts not suggestive of large-scale production (e.g. for sites in the Khabūr Plains Wasylikowa and Koliński 2013). There are no pressing reasons to store leguminous crops in structures separate from cereals, and so the paucity in the administrative cuneiform documentation cannot be attributed to a separation of accounting practices. Harvest accounts from Šušarrā do not explicitly state that cereals and legumes were stored together, merely that they were taken to the palatial storage. At Alalah, cereals and vetch appear together regularly in disbursement records, and again there is no reason to assume that they came from separate storage facilities.

7.2.2.1 Lentil

Lentil (*Lens culinaris*) rank among the most widely cultivated species of legumes attested in the archaeobotanical record (Zohary *et al.* 2012, 77). Lentil is a low, bushy annual, which sets oval pods containing up to three seeds. It is a hardy plant, well adapted to Mediterranean and Middle Eastern environments, and able to follow barley into many areas with poor rainfall or increased aridity. With an average protein content of 25%, domesticated lentil is one of the most important meat substitutes in agricultural communities. Wild progenitors can be found throughout the Middle East, and the earliest domesticated forms accompany those of emmer and barley, dating to the early Neolithic (Zohary *et al.* 2012, 80-81). Finds of lentil from the Early Bronze Age Jazīrah and the inner Syrian plains are common (e.g. at Ebla Palace G, cf. Wachter-Sarkady 2013, 391), but become less frequent in the Middle Bronze Age (Riehl 2010, 28 and Fig. 17 and 18). Still, they turn up in the Khabūr plain and at sites on the Euphrates in larger quantities than other legume taxa. The prominence of lentil is reflected by the dataset, when assuming that the Sumerian cognate is gu$_2$-tur, tentatively associated with Akk. *kakkû* or *abšu* (the latter being common in Assyrian sources, cf. Postgate 1987b, 94). Bulk amounts of this crop (Sum. gu$_2$-tur) are amply attested in harvest and sowing accounts from Šušarrā, and appear regularly in disbursement records from Alalah. Small amounts are issued as a component in royal meals at Ašnakkum (OBTCB 20, 50, and 114).

7.2.2.2 Pea

The garden pea (*Pisum sativum*) is a temperate annual shrub whose wild predecessors are common to cooler regions of the Mediterranean and the Middle

East. The plant sets elongated pods, each of which contain multiple seeds. As with other legume seeds, peas contain a high percentage of protein (around 22%). The seeds can be eaten in their unripe, green state, as is common in many strands of modern cuisine. In the past, the more common way of processing pea was to dry and split the seed, manifest today for example in Indian *dāl* (from Sanskrit 'to split'), a practice that allowed peas to be stored for longer time. Garden pea remains common across the Jazīrah throughout most of the 3rd millennium BCE (it is well represented at Ebla, cf. Wachter-Sarkady 2013, 391), but is only found in wetter areas in the 2nd millennium BCE (see, however, van Zeist 1984, 124). Given the plant's particular intolerance to drought, Riehl has linked this decline to increased aridity (Riehl 2010, 29). Given an association of garden pea with Akkadian *matqūtu* (a derivative of 'sweet', Akk. *matqu*), large amounts of peas appear in several texts from Šušarrā, in sowing records as well as harvest deliveries. While Eidem suggests *matqūtu* to refer to grass pea (*Lathyrus sativus*) (Eidem 1985, 27), the large amounts appearing in the texts combined with the poisonous ability of grass pea when consumed for prolonged periods by humans argues against this (consider also the rather modest appearance of grass pea in the archaeological record more generally, cf. Riehl 2010, 28).

7.2.2.3 Broad bean

Broad bean (*Vicia faba*), also referred to as 'faba bean' or 'horse bean' is a sturdy temperate shrub that grows well both in the Mediterranean and further north. Contrary to most other founder crops, the wild progenitor of the broad bean is not known, but it is assumed to relate to a group of wild vetches growing across Southwest Asia and the Mediterranean, even though the domesticated taxa are reproductively removed from any known wild relative (Zohary *et al.* 2012, 90). Given this state of knowledge, early traces of broad bean in the archaeological record from within the Mediterranean Basin are difficult to evaluate with regards to processes of domestication. The earliest reported finds of cultivated broad bean comes from northern Syria and has been dated to the 10th millennium BCE (Tanno and Willcox 2006). Specimens from north of the Alps, beyond the habitat of wild relatives, are evidently domesticated varieties and date to the 3rd millennium BCE (Zohary *et al.* 2012, 92).

Two different groups of broad beans can be distinguished, one older and more diverse group found primarily in Central and Southwest Asia, and another larger-seeded form common to the Mediterranean area. The former, with a markedly smaller seed size than modern varieties, would have been the type cultivated in the Bronze Age Ancient Near East (Duc *et al.* 2010, 271 with further references). Assuming a relationship with Sumerian gu$_2$-gal ('large pulse'), broad bean is not widely documented in the dataset. A couple of *sūtu* of broad beans appear in issues from Qaṭṭarā, with one entry qualified as 'crushed' (Akk. *pa'ṣātu*) (OBTR 191 and 192). Broad bean also occurs in an unclear context at Alalah (ATaB 41.61), and, in much more substantial numbers, at Šušarrā (especially Sh II 4, 6, and 47). Archaeobotanical datasets demonstrate similar patterns of distribution. A single seed was found in a late 3rd millennium BCE context at Tall Taya (Reade 1973, 187), and a few have turned up at Ebla (Wachter-Sarkady 2013, 391). Examples from later periods on the Khabūr are equally few in number (one potential seed from a Late Bronze Age context, cf. van Zeist 1999/2000).

7.2.2.4 Chickpea

Chickpea (*Cicer arietinum*) is an erect annual crop, which sets pods containing one or two seeds. Its wild progenitors are found in a relatively constrained area of the Taurus and Zagros in southeast Turkey (Lev-Yadun *et al.* 2000). Two general varieties, Kabuli and Desi, exist, the former is common to the Mediterranean and the Middle East (and is the one most common in Western supermarkets today), the latter is mostly found in Central and South Asia and Ethiopia, and exhibits a darker skin and a smaller average seed size (Zohary *et al.* 2012, 87 with further references). Today, chickpeas are grown as a summer-crop throughout the Middle East, a feature that sets it aside from all other legume founder crops. The reasons for this change is generally thought to relate to the crop's vulnerability to a certain strand of blight that can be largely avoided through spring-sowing (Zohary *et al.* 2012, 88, Abbo *et al.* 2003, also Halstead 2014, 24). The timing of this change, which is a result of human manipulation, is not clear, however. Roman authors write of chickpea as a summer-crop (Abbo *et al.* 2003, 436 with further references), but there is no clear indication from Middle Bronze Age sources that summer cropping of chickpea should have been practiced. In fact, the two sowing records from Šušarrā (Sh II 6 & 14) both include Akkadian *appānu* alongside legumes that we would expect to be sown in the autumn. Chickpea, in general, is rather rare in Middle Bronze Age archaeobotanical samples from across the Jazīrah and adjoining areas (and also in the Early Bronze Age, e.g. at Ebla, cf. Wachter-Sarkady 2013, 391). It appears very sparingly at Tall Mūzān (Riehl 2000, 231), and equally so in the Euphrates Bend and in the Jabbul Plain (van Zeist and Bakker-Heeres 1985, Schwartz *et al.* 2000, 442). In the present dataset, chickpea appears only at

Šušarrā, where fields are sown with chickpea (Sh II 4, 6, and 14) and received by harvest time (Sh II 33).

7.2.2.5 Vetch

Bitter vetch (*Vicia ervilia*) is a sturdy and drought-tolerant herbaceous annual, which grows well on poor or alkali-rich soils (Miller and Enneking 2014, 254-255). Bitter vetch belongs to a group of legumes that contain a moderate amount of toxins dangerous to humans and some animals. These can be removed through repeated soaking and leaching that makes the seeds palatable for human consumption, a reason why this type of vetch is often considered a last-resort in times of hunger (Zohary *et al.* 2012, 92). With an average protein content of some 25%, unprocessed seeds of bitter vetch form an excellent supplementary source of fodder for ruminants, especially cattle, but also sheep (Miller and Enneking 2014, 255-256). While toxic to monogastric animals, hindgut fermenters, e.g. equids such as horses and donkeys, are also able to consume moderate amounts of bitter vetch. Issues of vetch (Sum. zi-aš, Akk. *kiššanu*) for animal fodder are amply attested at Alalah and, in less conclusive roles, at Šušarrā. Though this offers no further information as to the exact taxon in question it clearly points towards a species of the genus *Vicia*, or perhaps grass pea (*Lathyrus sativus*). Arabic cognates to *kiššanu* refer to either bitter vetch (*Vicia ervilia*) or common vetch (*Vicia sativa*) (Stol 1985a, 130-131 with further references). Further, issues at Alalah appear in regular ratios to barley and emmer, a mix of fodder commonly seen in animal husbandry (e.g. Halstead 2014, 52). Though common vetch has been deemed the most likely candidate with respect to the alluvial south on botanical grounds (Stol 1985a, 130-132), bitter vetch is by far the variety most attested in archaeobotanical samples from across the Jazīrah and the Bilād al-Šām (Riehl 2010, 29-31 and Fig. 23 and 24). In environs close to Šušarrā, where we find textual attestations of Akk. *kiššanu*, archaeobotanical samples also contain bitter vetch (Helbæk 1960).

7.2.3 Sesame

Sesame (*Sesamum indicum*) is a tropical and remarkably drought-resistant annual crop, which is grown primarily for its extremely oil-rich seeds. It is commonly cultivated as a rain-fed crop, and shows little tolerance towards waterlogging. Being a summer crop in the northern hemisphere with a relatively short growing season, it further complements the agricultural cycle as it can be sown in late spring following harvest of winter crops, and reaped in late summer (Bedigian 1999). Sesame is now generally accepted to be the botanical cognate to Sumerian še-i$_3$-giš (or še-giš-i$_3$ in the alluvium) and Akkadian *šamaššammu* (Kraus 1968). The abundant attestations of these terms in cuneiform corpora were formerly matched by a puzzling absence of sesame in the archaeological record. Until very recently, there were no credible archaeobotanical attestations of sesame from the pre-classical Ancient Near East, prompting an alternative identification with flax or linseed, which is extensively documented (Helbæk 1966, Renfrew 1985a, for a summary of discussions, see Powell 1991). Flax does have cognates in cuneiform (Sum. gu for linen thread and gada for linen cloth, Akk. *kitu* is used generically for all flax products), but it is worth noting that these terms never appear in relation to oil (Kraus 1968, 114, Waetzoldt 1985, 77). The few substantial finds of sesame were formerly confined to adjoining regions, notably a large 6th century BCE oil-pressing facility excavated at Karmir Blur in modern Armenia, where excavators found large stores of sesame (Bedigian 1985, 168-170), and the belated discovery of sesame seeds among the food remains found in the 14th century BCE Tomb of Tutankhamen in the Nile Valley (de Vartavan 1990). The subsequent publication of some important archaeobotanical studies from the Tigris-Euphrates drainage has served to correlate past discussions. Sparse remains of sesame are found at mid-3rd millennium BCE Abū Ṣalābīkh (Charles 1993), at 13th century BCE Ṣabī Abīaḍ in the Balīkh valley (van Zeist 1994, van Zeist 1999), and a few seeds from contemporary and 7th century BC strata at Tall Šaykh Hamad on the Middle Khabūr (van Zeist 2001). The reasons for the relative paucity remain debated. Some have argued that sesame seeds are not inconspicuous in archaeobotanical samples, nor easily confused with other taxa (van Zeist 1985, 37), while others have suggested that the oil-rich plant remains easily disintegrate following charring or crushing, and are therefore only preserved under very particular circumstances (Bedigian 2010, 4, Zohary *et al.* 2012, 113).

The relatively few references to sesame crops in the dataset lend some important insights. Sesame was evidently grown in the environs of Tuttul in the Middle Bronze Age (see below), corroborated by a letter from Late Bronze Age Ṣabī Abīaḍ further north in the Balīkh, which also alludes to the growing and pressing of sesame to produce oil (Wiggermann 2000, 210-211 Text 212). Annual accounts of deliveries of sesame seeds to Middle Assyrian Aššur testify to the substantial production of sesame across the Jazīrah at this time (Postgate 1985, 147-149, also Postgate 2013, 113-115). We have already discussed the 5,400 litres issued for the pressing of sesame oil at Tuttul in early spring, and how this implies prolonged storage of substantial amounts of sesame seeds (6.8.1). The only other explicit reference to sesame at this site comes from KTT 306, a damaged record of disbursements of sesame seeds for a number of high-ranking individuals in the governor's household. While fragmentary, they do serve to indicate that sesame cultivation was practiced also at Tuttul on a quite substantial scale. Similarly, a lone document from the temple administration at Qaṭṭarā (OBTR 318) accounts for a total 5,200 qa (in the *šibšu*-measure) of sesame seeds. Dated in late autumn, it may represent that year's sesame harvest (note references in letters from the same context to sesame fields, e.g. OBTR 280, 293, and 309). The initial entry from a balance account of sesame and sesame oil from Mari (ARM 22, Text 276) is dated to the same month, and may be reconstructed to account for a total 106,200 *qa* of sesame (Durand 1984, cf. van Koppen 2001, 482). The latter number aligns relatively closely with figures seen in the alluvium (see Potts 1997, 68 with further references, with corrections given in the preceding chapter, cf. 66.68.61). Assuming a *qa* of sesame to equal 0.75 kg and calculating with an area yield of perhaps 800 kg/ha, a yield of 100,000 *qa* would require some 95 ha, or more than 260 *ikû* of cultivated land to produce.

7.2.4 Flax

Flax (*Linum usitatissimum*) is an annual winter crop that has historically been widely grown across Eurasia for its fibres and seeds. Flax seeds have an average oil content of ca. 40%. It figures prominently among the earliest domesticated crops in the Middle East, and appears to have been cultivated for its fibres from around 7,000 BCE (Zohary *et al.* 2012, 103-106). Stem fibres, when soaked, retted and broken, were used across the northern hemisphere for the production of linen cloth, and have only been supplanted by cotton for clothing and steam power for ship propulsion fairly recently (Vaisey-Genser and Morris 2003, 13-15). In contrast to sesame, flax can then be cultivated to enhance two distinct functional traits, namely longer stems to obtain a higher amount of long fibres, or increased seed size to achieve a higher oil yield. The two forms of selection are not mutually exclusive, but indicate preference of usage, potentially observed for example in the variation amongst flax cultivars in Ancient Egypt and further up the Nile Valley (Judd 1995). Flax cultivated for textile fibres is usually harvested before maturation of the seeds (Zohary *et al.* 2012, 101). Theoretically, linseeds form an easily accessible source of vegetable fat. The impracticalities of keeping linseed oil edible for any meaningful length of time suggests that they were mainly consumed in seed-form, if at all. Archaeological evidence for the sustained cultivation of flax as an oil-crop finds only very limited support in textual sources. Though linen products are amply documented in the cuneiform record, there are no references to linseed oil (Kraus

1968, 114, Waetzoldt 1985, 77). The general ignorance with regards to flax as a source of oil throughout the works of most Roman and Greek writers further substantiates an argument for linseed as grown almost exclusively for its fibres in antiquity (Powell 1991, 160).

7.2.5 Vegetables

The vast majority of vegetables consist exclusively of soft and easily perishable tissue, meaning that plant remains are only extremely rarely preserved in archaeological contexts in the Middle East (e.g. the meagre overview by Renfrew 1987). As such, vegetables constitute the least known group of plants in the archaeobotanical record (Zohary *et al.* 2012, 6). Two common indicators of vegetable consumption in reports from sites in Iraq are bulbs of garlic (*Allium sativum*) (van Zeist 1984, 124-127) and seeds of fruits from the family *Cucurbitaceae* (e.g. from Early Bronze Age Tall Taya, cf. Reade 1973, 186). As a chief source of vitamin C, vegetables are, however, not without import in dietary regimes, and we should expect a potentially large variety of leafy and root vegetables, onions, cucurbits, and flavouring plants to have been grown and consumed (Powell 2003, 19-21). The present section reviews the principal vegetables appearing in the textual record, but could obviously have been much more extensive. Most leafy vegetables, e.g. lettuce (*Lactiva satuva*) would have been cropped regularly, along with garden cress (*Lepidium sativum*) (Powell 2003, 19-20, note also the attestation, although probably wild, of the latter at Middle Bronze Age Tall Mūzān, cf. Riehl 2010, 36).

Data Type	Detail Data Type	Description
Botanical (Reference)	Leek (Akk. *karašu*)	Probably wild leek (*Allium ampeloprasum*)
	Onion (Akk. *hazannu*)[SZE]	Garlic (*Allium sativum*)
	Onion (Akk. *andahšu*)[SZE]	Species of onion (*Allium cepa*) and shallot (*Allium ascalonicum*).
	Onion (Akk. *kunibhu*)[SZE]	
	Vegetable (Sum. alakka)[SZE]	Generic.

Table 7.32: Detail Data Types for vegetables

In the alluvial plain, garden vegetables have typically been cultivated in orchards, where date palms and fruit trees provided shade and protection against the wind, though they can also be grown in fields and on riverbanks (Charles 1987). Though much historical information on gardening in the Ancient Near East comes from high-status contexts, the wide array of crops grown in orchards and gardens both here and in the Mediterranean must to some extent reflect common patterns (Leach 1982). The perishable nature of most garden vegetables may explain their absence in most administrative records, but I also consider some socio-economic variables in the end of this chapter. Bulbous crops form an exception, as onion and garlic could be dried, bundled and stored (Stol 1987, 65-68).

7.2.5.1 Onion, garlic, and leek

Members of the genus *Allium*, e.g. onions, garlic, and leek, are bulbous herbs cultivated primarily for their bulb, which can be stored for longer periods of time. Wild relatives are native to Central and Southwest Asia and the Mediterranean, and constitute a large and diverse group. Species of *Allium* have been only sparsely discussed by cuneiform specialists (e.g. Waetzoldt 1987b, 23 with further references). In Early Bronze Age sources from the alluvial plain, a multitude of designations occur (through qualifications of the generic Sum. sum, Akk. *šūmu*, meaning 'garlic'), and a similar variety is seen at Ebla, where we find early Akkadian cognates such as *karašu* and *hazannu* (Waetzoldt 1987b, 31).

Onions (Sum. sum-sikil, Akk. *šamaškilu*) appear in a number of varieties also in Middle Bronze Age sources from the alluvium. Later Assyrian designations appear in texts from Šehnā, e.g. *kunibhu* and *andahšu* (Postgate 1987b, 97). The latter is commonly understood as 'small onion', perhaps shallots. Garlic, for the Middle Bronze Age, is associated with Akk. *šūmū* and *hazannu*, the latter being a synonym widely used in the Jazīrah, e.g. at Mari and Šehnā (Stol 1987, 58-59). Garlic was harvested in spring in the alluvial plain, and there is little reason for us to assume that this differed markedly from practices further north (Stol 1987, 58). Leek (Akk. *karašu*) is most likely a close relative of the wild leek (*Allium ampeloprasum*), native to the basins of the Mediterranean, the Black Sea, and parts of Southwest Asia (Stol 1987, 62). Postgate has suggested a link between a later Assyrian derivative of *karašu* and Arabic *kurrāth* ('leek') (Postgate 1987b, 97-98).

Within the present dataset, a small set of texts from Šehnā relating the issue of onions (Akk. *kunibhu* and *andahšu*), garlic (Akk. *hazannu*), and leek (Akk. *karašu*) merits attention. These encompass materials for cooking, for example *mersu*-bread (Vincente 1991, Text 131 & 145), and include issues of spices, e.g. saffron, and other commodities as well, e.g. fish and shellfish or shrimp (e.g. Vincente 1991, Text

143). As with other resource accounts from within the palatial household, the amounts concerned are rather small, small onions (Akk. *andahšu*) being counted individually or measured out in shekels, while onions (Akk. *kunibhu*) and leek (Akk. *karašu*) appear in larger quantities of a *qa* or more (Vincente 1991, 346-347). The co-appearance of vegetables and marine foods, which strongly suggest the latter to have been kept in a dried or preserved state, is seen also in the storage inventory OBTR 204 from the palace at Qaṭṭarā. Here, a jar (Sum. dug) of leeks is listed together with a basket (Sum. ^{gi}pisan) of shrimps.

7.2.5.2 Melon, cucumber, and gourds

Taxa of the family *Cucurbitaceae* are well suited for cultivation in arid and semi-arid zones of the Middle East when provided with sufficient water. As most of these are vulnerable to fungi under more humid conditions, they are typically grown as summer crops with a growing period of three to four months (Charles 1987, 6). Some taxa common to the Middle East today are relative newcomers, e.g. the watermelon (*Citrullus lanatus*), which originates in Africa and reaches Europe, India and China during the Iron Age (Dane and Liu 2007, 1256, Zohary *et al.* 2012, 153-154, also Sabato *et al.* 2015). The bottle gourd (*Lagenaria siceraria* syn. *vulgaris*), commonly known because of its characteristic shape and qualities as a container, is not much grown for consumption, as the flesh has a bitter taste (Charles 1987, 7-8). It is absent from the archaeological record of Europe and the Middle East until Roman times (Schlumbaum and Vandorpe 2012, 499-500 with further references, the basis for its cultivation in the Ancient Near East seems scant, cf. Stol 1987, 83). The colocynth (*Citrullus colocynthis*) grows wild across deserts of the Middle East and North Africa, but is generally considered too bitter for human consumption even though it appears in archaeological strata from the Neolithic and later on (Zohary *et al.* 2012, 154).

The muskmelon (*Cucumis melo*), an older relative of the honeydew melon, and the related cucumber (*Cucumis sativum*), are natives of Asia and Australia (Sebastian *et al.* 2010). Both appear in eastern Iran in the 3rd millennium BCE, the former also in the Nile Delta at around the same time. Textual information on cucurbits, even from administrative cuneiform records, is almost non-existent, and the principal basis for identification of Sumerian and Akkadian cognates are lexical lists (Stol 1987, 82). Cucumber is reliably associated with Sum. ukuš$_2$, Akk. *qiššû*, qualified with regards to size and season, e.g. summer and winter cucumber (Stol 1987, 83). In the present data set, the only reference is the mentioning of cucumber seed in an enigmatic text from Qaṭṭarā (OBTR 328). As Stol has suggested, identifying melon may be even harder given that it appears to be referred to as a variety of cucumber (Stol 1987, 83).

7.2.6 Fruits

Fruit (and nut, see 7.2.7) appear most sparingly in the textual corpora studied here, yet archaeological attestations and more general historical concerns should cause us to linger at their use for a moment. Various types of fruit (Sum. nigsaha, Akk. *muthummu*, in the north Akk. *azamru*, cf. Postgate 1987, 117) were available to and produced by Bronze Age communities across the Jazīrah, in the Bilād al-Šām, and in the Zagros. Horticultural practices in these regions differ from practices in the southern alluvium in a few, albeit important respects. The lowlands relied primarily on grapes, figs, and, above all, dates. Apart from its nutritious crop, the prominent role of the date palm in alluvial horticulture was equally due to its ability to provide a canopy protecting smaller trees and vines from the scorching sun (Potts 1997, 69). Dates appeared as an import in the upland plains, but the cultivation of date palms north of the alluvium is restricted by the harsher winter cold. Date palms may grow beyond this zone, but they are unlikely to produce fruit of any significance (Powell 2003, 17, Zohary *et al.* 2012, 131). Topographical constraints in access to regular water supply limited the maintenance of orchards in the drier tracts of the dry-farming belt to areas around perennial streams (Postgate 1987a, Janick 2005, 267). Most common fruit trees require more than 500 mm of annual precipitation to grow without sustained irrigation, which effectively limits their dry cultivation to the flanks of the Taurus and Zagros mountains (Charles 1987, 4). The principal horticultural regime in the Jazīrah and the Bilād al-Šām consisted of olive, grape, and fig, with pomegranate making regular appearances (Zohary and Spiegel-Roy 1975, 324).

The extent to which a wider range of fruit-bearing trees and shrubs were continuously cultivated remains elusive given the relative scarcity of source material, however, and gathering of resource from wild plants should not be excluded (Powell 2003, 13, Tengberg 2012, 182). The more complex process involved in the propagation of common species of fruit-bearing trees of the family *Rosaceae*, such as apple, pear, plum, and cherry, and the lack of affirmative evidence for such practices in the Bronze Age Ancient Near East, would argue against extensive utilisation of these cultivars (Mudge *et al.* 2009, 439 & 449-450, Zohary *et al.* 2012, 115). A text from Mari concerning orchards (ARM 22/1 Text 329) makes reference to 'shoots' (Akk. *per'u*) and 'sticks' (Akk. *haṭṭu*) commensurate with vegetative propagation. Contrary to cereals, legumes, and vegetables, fruit-bearing trees, shrubs, and vines are perennials, and their cultivation represents a considerable investment of time and labour. Olive trees may grow for ten to twelve years before they set fruit, fig and grape around five (Zohary *et al.* 2012, 114). The hefty fees imposed in the Code of Hammurabi upon people who cut down a tree in another man's orchard underscores this point; a fine of 30 shekels of silver equals more than 5 tonnes of barley (CH §59). All things told, sustained cultivation of fruit trees in much of the study area would have required prime soil, good trees, and an ample and steady supply of irrigation water, necessities that may explain their rather modest appearance in administrative accounts.

7.2.6.1 Fig

Fig (*Ficus carica*) is a deciduous shrub or low tree native to the Middle East and west Asia. It grows in sunny and dry areas on both sandy and rocky soils, is able to withstand considerable environmental stress, and is further able to grow at relatively high altitudes and in areas with harsher winter climate. The crop ripens in late summer, and can, in a dried state, be consumed throughout the year. Like olive, the fig is easily propagated through cuttings. Fig remains are found in archaeological contexts as early as the Neolithic, and fig has been widely cultivated throughout much of Middle Eastern history (Zohary *et al.* 2012, 126-127). Remains of fig in the Bronze Age archaeological record are relatively sparse, especially in the Jazīrah and further east (note the absence of fig remains at Early Bronze Age Ebla, cf. Wachter-Sarkady 2013). On this basis, Riehl observes that cultivation of fig must have been very limited during the Early and Middle Bronze Age (Riehl 2010, 33-34). When turning to textual sources from Mari, however, fig (Sum. peš, Akk. *tittu*) appears to be the most extensively grown fruit tree next to grape in the Middle Euphrates Valley, with apple, and occasionally pomegranate in smaller numbers (e.g. ARM 22/1, Text 329, cf. Mori 2007, 47).

7.2.6.2 Olive

Olive (*Olea europea*) is native to the Mediterranean environment and probably among the first domesticated fruit trees in the region, having been cultivated from the Chalcolithic period onwards (Zohary *et al.* 2012, 119-121). Olives are evergreen low trees or shrubs with a preference for calcareous or light soils, e.g. limestone slopes or similarly rocky terrain. As opposed to many fruit trees, olives can be successfully propagated through cutting, which probably accounts for their early domestication (Kaniewski *et al.* 2012, 890). Cultivation of olive originates in the

Eastern Mediterranean, and appears widespread in the Bilād al-Šām from at least the 3rd millennium BCE onwards (Riehl *et al.* 2012, 127). Further south, in Egypt, olive cultivation was probably introduced during the 2nd millennium BCE, and appears to be common in a New Kingdom context (Serpico and White 2000, 398-399). Pollen cores from the Orontes Valley upstream from Alalah indicate a pronounced increase of *Olea* from the late 3rd millennium and throughout most of the 2nd millennium BCE (Yasuda *et al.* 2000, 131-133 and Fig. 137, see also earlier investigations by van Zeist and H. 1980). A detailed study of pollen assemblages from Tall al-Tawīnī, further west on the Mediterranean coast, suggests the spread of olive vegetation during this period to derive from undomesticated taxa, however, and so we should be careful not to overstate the level and intensity of purposive olive cultivation during Alalah Level VII (Kaniewski *et al.* 2009, 1042-1045, consider also the discussion given in Frankel 1999, 36-37). The organised cultivation of olive as a source of plant oil is evident from texts as early as the mid-3rd millennium BCE, at Ebla, where olive stones are also well represented in archaeobotanical samples (Archi 1991, Wachter-Sarkady 2013). Remains of olive are more or less absent east of the Euphrates (nine stones from an Early Bronze Age context at Tall Taya represents a notable exception, cf. Reade 1973, 187, also Riehl 2010, 31-32). As a traded commodity, the lack of a cognate word for olive in Sumerian suggests that its introduction further east and south came relatively late (Powell 2003, 18). We have already seen that the Sumerian giš-i$_3$ was used for the olive at Ebla and later for sesame in the Jazīrah, while Akkadian *serdu* only appears in the Middle Bronze Age and primarily at Mari (Waetzoldt 1985, 77). Among the settlements considered here, only Alalah would have seen extensive cultivation of olive, yet the administrative documentation from the site offers no information on these practices (but see discussion by Durand 2002, 82-84). Olive cultivation in northern Iraq in modern times should warn us against ruling out its use further east, however (Postgate 1987a, 130). Olives are harvested in the autumn, in Israel beginning around mid-October (Frankel 1999, 137). The processing of olives shares many characteristics with that of grapes, namely the initial crushing or treading of the fruit, and the subsequent extraction of various qualities of sap from the first, second, and occasionally third pressing (Frankel 1999, 46-48). Following pressing, olive oil can be stored in ceramic containers for prolonged periods of time, and used for a wide variety of culinary purposes, as an ointment, and as a lubricant.

7.2.6.3 Grape

Grapevine (*Vitis vinifera*) is a deciduous vine cultivated for its very sugar-rich fruit, which also forms the basis for making wine. The wild progenitor of the grapevine (*Vitis vinifera* ssp. *sylvestris*) is found on the flanks of the Elburz, Caucasus, and Taurus ranges, on the shores of the Black Sea and throughout much of the Mediterranean region (Zohary *et al.* 2012, 122-124). The fruit ripens in late summer or early autumn, depending on local environmental configurations, and can be stored in a dried form, as raisins, for longer periods. Wild seeds occur occasionally in archaeobotanical assemblages in the Bilād al-Šām already from the Neolithic (Nesbitt 2003, 28), while the earliest domesticated varieties may date as early as the 6th millennium BCE, and are commonplace throughout Iran, Armenia and Anatolia by the 4th millennium BCE (Tengberg 2012, 185-188). The first finds of domesticated grape in the Bilād al-Šām date slightly later, but viticulture appears to have been widespread through most of the Early Bronze Age and formed the basis for an extensive trade across the Bilād al-Šām, the Eastern Mediterranean and Egypt already from this time (Zohary *et al.* 2012, 124-126). For the same reason, grape and its derivative products, notably dried raisins, wine and possibly fruit syrup, are among the few products of horticulture extensively documented in administrative sources considered here.

We have already discussed the extent of wine production and consumption as evidenced in the present dataset (6.10), and a few notes on the propagation and cultivation of grapevine will suffice here. As argued earlier, grape cultivation was quite probably practiced on a substantial level around Šehnā in the Middle Bronze Age (Vincente 1991, 305). Nearby, at Urkiš, finds of grape pips from contemporary strata also indicate grape cultivation, though not on a large scale (Riehl 2010, 32-33). Further east, below the anticlines, Early Bronze Age strata at Tall Taya yielded traces of grape cultivation (Reade 1973, 187), further compounded by the relatively substantial amounts of wine appearing in the documentation from Qaṭṭarā (6.10.4). With regards to winemaking, the value of grapes that could be produced below the anticlines is somewhat doubtful. We should remember here Powell's forceful argument for seeing grape cultivation in the southern alluvium as geared primarily towards the production of raisins, as these form an important and storable source of sugar (Powell 1995, 103-106). This mode of processing is borne out also further north:

> "My lord wrote me, saying: "Until the inspectors (Akk. *ebbūtu*) whom I will send to you (arrive), grapes must not be picked. Now, the time for picking grapes and turning them into raisins (Akk. *muziqu*) has come. My lord must send inspectors and the grapes must be picked."
>
> (FM 11, Text 188 v. 5-8, r. 1-6)

In the Middle Euphrates Valley, at Mari and further north, viticulture was evidently widely practiced, and some wine also produced (Chambon 2009a, 10-11, note also the early reference to transporting grapevine cuttings discussed by Lion 1992, 108-110). The richly attested contemporary trade in wine and syrup from Karkamiš and the Taurus foothills suggests that we should view grape cultivation within the wider region as serving a variety of purposes (Mori 2007, 47).

7.2.6.4 Pomegranate

Pomegranate (*Punica granatum*, Sum. nurma, Akk. *nurmû*) was a popular supplement to chief horticultural staples such as olive, grape, and fig. The pomegranate is a deciduous shrub or low tree, self-pollinated, easily propagated through cuttings, and very long-lived. Like grapes, the crop is rich in sugars, and this was likely one of the prime reasons for its cultivation. Originating in the Anatolian and Iranian plateaus, the plant is well adapted to the Middle Eastern climate, being drought tolerant and able to withstand mild levels of frost. Pomegranate was probably introduced into the alluvium towards the end of the 3rd millennium BCE, as it is not mentioned in sources pre-dating the Old Akkadian period (Powell 2003, 19). Plant remains are attested archaeologically mainly in the Bilād al-Šām from the Early Bronze Age onward, and appear east of the Euphrates mainly in the Middle Bronze Age and especially in the Iron Age (Nesbitt 2003, 28). Pomegranate does not appear to have been cultivated on an extensive scale, though this may be a question of socio-economic status (Postgate 1987a, 127). In the aforementioned record of orchards around Middle Bronze Age Mari (7.2.6), pomegranate trees appear in small numbers next to apple, and, especially, grape and fig.

7.2.6.5 Apple

Apple (*Malus* sp.) is one of several economically important species in the family *Rosaceae*, alongside pear, quince, plums and cherries. It is a deciduous low tree, adapted to temperate environments, and generally requires good soils in order to grow. Apple trees can be grown throughout the temperate climatic zone, but thrive mainly in regions with relatively cold winters. Their fruit ripens in late summer and can, in a dried state or kept in a cooled environment, be preserved for some time.

Apple trees are not self-pollinating, and are primarily propagated through grafting. Propagation through cuttings is possible, but hard to control. Wild species of apple grow across the Asian continent, and while the domesticated taxon is primarily Central Asian in origin, various forms draw on several wild progenitors (Cornille *et al.* 2012). In the Middle East, indigenous species of crab apple (e.g. *Malus orientalis*), smaller and more bitter than the common apple, are found in mountain valleys in and around the Anatolian plateau, but they have also been observed in oases in the Arabian Peninsula in modern times, and could have been introduced on a smaller scale to orchards in warmer areas in antiquity (Ellison 1978, 209, Zohary *et al.* 2012, 137-138). The spread of the larger and sweeter common apple (*Malus domestica*) is most likely of a later date (Nesbitt 2003, 27). The only attestation of apple in archaeological strata from the Bronze Age Ancient Near East known to me comes from an Early Dynastic grave at Ur, which contained dried crab apple, cut in halves, dried, and put on a string (Ellison *et al.* 1978, 172-173).

Apple appear in cuneiform sources from the 3rd millennium BCE onwards (Sum. hašhur, Akk. *hašhūru*), e.g. in a Neo-Assyrian letter, which mentions large quantities of apple from the region around Tall ’Afār (ABL 813, cf. Postgate 1987a, 130). A more generic use of the Sumerian and Akkadian terms as references also to varieties of quince and pear should not be excluded (Powell 2003, 15-16). Allusions to apple trees and their fruit appear in letters and administrative texts from Middle Bronze Age Mari, but not in numbers indicative of cultivation on the same scale as fig. The letter OBTR 126 accompanies a gift of apples and pistachio nuts (*hašhurī ù buṭumtī*) to Iltani of Qaṭṭarā, said to be the ‘first fruits of the year’ (*nisan šattim*) (cf. Durand 1998, 92). The Sumerian and Akkadian words for ‘apple’ have been related to apricot (*Prunus armeniaca*) given the attested practice of drying the fruit in question, yet several authors have remarked upon the almost non-existent botanical basis for this interpretation (Postgate 1987a, Powell 1987). Apricot is generally considered as originating in China, but seeds are attested archaeologically in Armenia as early as the 3rd millennium BCE, and from various locations throughout the Ancient Near East from the Iron Age onwards (Faust *et al.* 1997). It is not known from Bronze Age archaeological contexts associated with cuneiform documentation, however (Powell 2003, 16) and the aforementioned attestation of crab apple at Ur, found in a dried and stringed state, obviously weakens the argument further (Postgate 1987a, 119).

7.2.6.6 Pear

Pear (*Pyrus* sp.) is a relative of apple, and likewise a deciduous low tree common to mild temperate regions of Europe, the Mediterranean, and Asia. The domesticated varieties share a history of migration with apple, originating in Central Asia, and thence spread westwards. As with the apple, pear thrives best in areas with sufficient winter chill to initiate bud dormancy. The European pear (*Pyrus communalis*) is a later descendant and is mentioned in Greek sources (Janick 2005, 289-290). More relevant here are a couple of wild species indigenous to the Middle East (e.g. *Pyrus syriaca*), edible though smaller than their European relative and appearing at prehistoric sites in the Bilād al-Šām (Nesbitt 2003, 28). Finds from most historical periods are scarce (Zohary *et al.* 2012, 140), but pear remains from the Middle Bronze Age Euphrates Bend should be noted (Matilla Séiquer and Rivera Núñez 1994, 176). Letters from Mari speak of pears, e.g. in ARM 4, Text 42, where Išme-Dagan sends his brother a gift of pears and pistachios (*kamiššarī ù buṭmatī*) from the environs of Jabal Sinjār. Another text (ARM 11, Text 93) concerns 200 *qa* of pears issued for stewards (Akk. *abarakku*), but examples of the administrative management of fruits at Mari are otherwise rare (Burke 1963, 141 with further references). Pear appears also in Late Bronze Age sources, e.g. at Nuzi in the 14th century BCE (Postgate 1987a, 129-132).

7.2.6.7 Plum and cherry

Varieties of the genus *Prunus,* another branch of the family *Rosacea*, count almond, apricot, cherry, peach, and plum. These constitute a mixed group of shrubs and trees that yield smaller fruits and nuts, and share many characteristics with apple and pear, for example in terms of habitat and annual cycle (Janick 2005, 290). Several of these species are unlikely to have been found in the Ancient Near East prior to the Iron Age. We have already touched on the lack of evidence for apricots in Bronze Age contexts, and the same goes for peach (*Prunus persica*), unlikely to have reached the region prior to the Achaemenid period (Powell 2003, 18, Zohary *et al.* 2012, 144). Three main species of cherry originate in the regions bordering the Black Sea, of which the sweet cherry (*Prunus avium*) and the sour cherry (*Prunus cerasus*) could possibly have been transported south of the Taurus, though extensive propagation of cherry trees is dependent on grafting. The plant is not securely identified in Sumerian or Akkadian (Powell 2003, 16), and archaeological attestations in Syria and Iraq relate to the native mahaleb cherry (*Prunus mahaleb*), found e.g. at Early Bronze Age Hammām al-Turkmān and common across the upper Jazīrah. The kernels are often used for flavouring, but mahaleb is otherwise considered of limited value as a fruit (Nesbitt 2003, 27). In Neo-Assyrian contexts, we find potential words for plum such as Akk. *angāšu*, *šalluru*, and *hahhu* (cf. Postgate 1987a, 129-132), which Powell cautiously associates with cherry plum (*Prunus cerasifera*) and domesticated plum (*Prunus domestica*) (Powell 2003, 19). Textual references for the upland plains, closer to the main habitats of wild species of plum, in the Bronze Age are not able to offer any further degree of precision. Lack of conclusive evidence for grafting further renders extensive cultivation of plums unlikely, and consumption will have relied extensively on gathering from the wild (Zohary *et al.* 2012, 142-143).

7.2.7 Nuts

Like fruit, nuts (here including true nuts such as walnut and hazel, and drupes or stone fruits such as almond and pistachio) are not much in evidence in the present dataset or in the Bronze Age cuneiform record more generally. Almond and pistachio are relatively common, and used also for their oil, but specific designations are otherwise hard to identify (Nesbitt and Postgate 2001, 633). In contrast to the southern alluvium, a relatively large selection of nut-yielding trees and shrubs would have been able to grow in the dry-farming plains and, especially, in upland environments, and gathering from the wild would have been common.

7.2.7.1 Almond

Almond (*Prunus amygdalus* syn. *Amygdalus communis*) grows wild throughout Syria and Turkey and was likely exploited from an early point in history (Janick 2005, 291). Almonds are deciduous low trees that grow well in Mediterranean climates with hot summers and relatively mild, wet winters. Almond trees are able to endure somewhat higher levels of aridity than olive and grape, and are relatively easily planted from seeds. The crop is a stone fruit, like peach, and upon harvesting the soft outer hull and the woody endocarp are removed to expose the seed. Given the common occurrence of almond trees in steppe environments across the Jazīrah and the Bilād al-Šām (2.4.3), it should come as no surprise that almonds are relatively well attested in archaeological samples, and some domestication should also be expected (Zohary *et al.* 2012, 148-149). It appears in cuneiform sources already in the 3rd millennium BCE (Sum. lam, Akk. *šiqdu*), yet there are only scant references to the tree and its fruit in administrative contexts (Nesbitt and Postgate 2001, 633-634, see for a rare example of a shipment of nuts, among others almond and terebinth, from Mari Durand 2001, 129-132).

7.2.7.2 Terebinth

Terebinth is a generic name for several species in the genus *Pistacia*, all relatives of the common pistachio (*Pistacia vera*), e.g. *Pistacia terebinthus*, *Pistacia atlantica*, *Pistacia khinjuk*, and *Pistacia palestina*. The former originates in the steppe forests of Central Asia, but is unlikely to have been introduced into the Middle East and the Mediterranean prior to the late Iron Age (Zohary *et al.* 2012, 151-152). Species of terebinth are generally shrubs or small trees, common to park woodland and steppe environments across the dry-farming plains and piedmont. Remains of fruit of terebinth are abundant at archaeological sites from the Neolithic onwards, but identification to species level is very difficult (Nesbitt and Postgate 2001, 634). Substantial amounts were found in a storage context at Ebla Palace G (e.g. Wachter-Sarkady 2013, 388), and samples from the alluvium are probably indicative of export from the upland plains (e.g. discussion by van Zeist 1984, 125). The terebinth is associated with Sum. lam-gal ('big almond'), Akk. *buṭnu*, and appears alongside almond in lexical lists (Postgate 1987a, 133, also Nesbitt and Postgate 2001, 634). An association of a related cognate in Sumerian (Sum. lam-tur) with the relatively smaller *Pistacia khinjuk* is uncertain (cf. Stol 1979, 1-16, Postgate 1987a, 134). As domestication of pistachio is dependent upon grafting, gathering of nuts from the terebinth was most likely from wild specimens.

7.2.7.3 Walnut and hazel

Walnut (*Juglans regia*) is a large deciduous tree that grows wild in temperate deciduous forests in Turkey and Iran, and can also be found in northern Iraq today (Postgate 1987a, 134). Wood remains dating to the end of the Middle Bronze Age are attested in the Middle East, but most finds and indications of more widespread cultivation relate to around or just before Roman times (Zohary *et al.* 2012, 150). There are no known signifiers in cuneiform sources, but Postgate suggests that walnut could reasonably have been grown in or imported into Assyria during the Iron Age (Postgate 1987a, 134), and there are no pertinent reasons for it not to have been propagated in the Bronze Age (see for recent evidence on the Middle Bronze Age cultivation of walnut in the highlands around the Jordan Valley Langgut 2015). Hazel (*Corylus avellana*) is a nut-bearing shrub naturally confined to the Black Sea region and thus further removed from our study area than walnut. Uncarbonized remains are attested archaeologically at Neo-Assyrian Nimrud (Helbæk 1966), though most likely as an import. Given the relative proximity of the Anatolian plateau to our study area, we might expect it to appear at some of the study sites (see e.g. recent arguments for Bronze Age trade in hazel at Kültepe, cf. Fairbairn *et al.* 2014), but the absence of hazel from Bronze Age archaeological strata suggests a very limited scale. Again, no recognisable cognates are known in cuneiform sources (Postgate 1987a, 134).

7.3 Field management

The above sections presented major resource types which, drawing both on the present dataset and on inferences from the wider study region, should have been relevant elements of Bronze Age agricultural production. In the latter half of this chapter, I focus on the managerial organisation of agricultural production in order to situate the infrastructural abilities of the institutional household economy within their environmental, technological, and social context. I take a particular interest in logistical demands of tilling, planting, reaping, and processing crops, variables that will serve to frame our discussion of the scale of agricultural production in Chapter 9. In the following, I discuss first the composition and capability of plough teams, with a specific emphasis on draught animals. Second, I discuss the practical and infrastructural aspects of ploughing and sowing, the tilling capacity of plough teams and average sowing rates. Third, I discuss reaping, threshing, winnowing and further processing of grain. Here, I focus in particular on the labour input required by harvest time, and the shortage of labour often emerging from epistolary sources. Fourth, I make some general observations on rural transport and storage. I conclude by discussing in more detail the relative infrastructural constraints implied by labour shortages at critical points, namely ploughing and harvest. This part of the chapter then serves to highlight key logistical constraints and opportunities in the procurement of subsistence resources within the institutional household economy. The conclusions discussed in the final section are of relevance both for our subsequent discussion of livestock management, in Chapter 8, and adds weight to considerations of infrastructural capabilities advanced in Chapter 9.

7.3.1 Plough teams

Taking our cue from Mari sources, the organisation of institutional labour, i.e. workers, livestock, and tools, revolved around the plough team, supervised by a manager or 'farmer' (Sum. engar, Akk. *ikkaru*) who reported to the managerial staff or head of the institutional household (Mori 2007, 49). In the Middle Euphrates Valley, estates were entrusted to governors or high officials, who managed institutional holdings assigned to them with an extensive degree of autonomy. This infrastructural outline seems generally applicable. The lord of Ašnakkum, for example, maintained a secondary estate in Ekallātum on the Middle Tigris, and one inventory from the grain storage archive lists workers and a couple of agricultural managers despatched to this estate (OBTCB 84). Agricultural managers appear at most of the study sites, e.g. at Ašnakkum (OBTCB 66 and 70), Tuttul (KTT 120), and Alalah (Zeeb 2001, 307-310). The principal tasks of the plough team related to ploughing and sowing (Potts 1997, 82-84), but agricultural managers could also oversee the gathering, threshing, and storage of the harvest, as demonstrated in KTT 120 (cf. 7.5).

7.3.1.1 Agricultural personnel

The composition of plough teams and the number of draught animals employed are important when calculating the extent of agricultural land that could be cultivated. In the Mari documentation, a plough team encompassed several specific working designations. The farmer (Sum. engar) oversaw personnel, draught animals, and agricultural tools. At his disposal, we find workers tasked with steering the plough, and also seeders, irrigators, ox-drivers and weeders. In some instances, plough team rosters also include grinders charged with preparing flour for the plough team personnel (van Koppen 2001, 468-470). While some fragmentary grain ration disbursements from Tuttul relate to the upkeep of institutional plough teams, similar records from e.g. Ašnakkum are terser and give no details on individual worker specialisation (see for example OBTCB 66 and 70).

7.3.1.2 The plough

With 'plough' (Sum. giš-apin, Akk. *epinnu*), we understand in a Bronze Age context the ard or scratch plough (Potts 1997, 73-75). With animal traction, the ard was able to loosen the ground to a depth of some 15-20 cm, thereby breaking the capillary network and preserving soil moisture. In contrast to the modern turnplough, which is an invention of the Iron Age, the ard does not effectively till the soil (hence the English 'scratch plough') (for a useful global overview, see Hopfen 1969, 44-69). Due to its small weight, the ard is relatively easy to transport, and performs well also on stony ground, in upland terrain, or, when pulled by a single draught animal to increase manoeuvrability, in orchards or woodland. The manufacture of an ard required hard and carefully chosen wood, e.g. from species of oak, but is not necessarily dependent on specialised craftsmen (Palmer 1998, 141-142, Halstead 2014, 47-48). Given the force exerted during ploughing, ards could and did break. Cultivators would have required replacements regularly (Halstead 2014, 48, also Potts 1994, 164, Hruška 2007, 60).

Both the ard and the seeder plough (which is, strictly speaking, also an ard) are not affirmatively attested in the archaeological record from the Bronze Age dry-farming plains or piedmonts, hardly surprising when considering that these implements were made from wood (Seidl 2003, plough shares are known from the Iron Age on, cf. Potts 1994, 162-164). Evidence for their use comes primarily from iconographic sources (e.g. Hruška 1984). The seeder plough adds to the functions of the ard the capability to seed fields in furrows at regular intervals by dropping individual seeds through a funnel, thereby lowering the amount of sowing seed used substantially (Potts 1997, 78-80). There are no affirmative references to the use of the seeder plough in the dry-farming plains (it may be present at Mari, cf. van Koppen 2001, 469), but low sowing rates relative to surface extent suggests cultivation in furrows, and by inference with a seeder funnel (more on which below. Note that the use of seeder funnels is common across many parts of Eurasia, as evidenced by e.g. traditional farming practices around the Jordan discussed by Palmer 1994, 97, in Turkey, cf. Postgate 1994, 168-169, in India, cf. Hopfen 1969, 82-84).

7.3.1.3 Draught animals

We will discuss the number and use of draught animals in plough teams at length, since these weigh most critically on the extent of agricultural lands that the institutional household was able to cultivate. Animal traction in Bronze Age agriculture relied on donkeys, mules and oxen. Horses can provide excellent traction, but do not appear as draught animals in agricultural work here (a preference also seen in more recent times, e.g. Goe and McDowell 1980, 16-17, Palmer 1998, 142). They were used for riding in the Jazīrah as early as the beginning of the 2nd millennium BCE (e.g. Eidem 2011a, 81 with further references), and their higher speed of travel in comparison to other equids obviously played a role here. The same applies to their use in teams (Akk. *ṣimdu*) as traction for chariots (see Moorey 1986, for a historical overview), in which role they appear e.g. at Ašnakkum (e.g. OBTCB 22, 31, 65, 72, 74). In the following, I focus primarily on the availability and capability of tractive power. I discuss the training and maintenance of draught animals in more detail in the next chapter (8.1.1.1). Draught animals in general are able to sustain a draft pull equal to 10-20% of their body weight, with traction power being a function of object weight, surface resistance, and the force exerted by body weight (Stout 1990, 82-83). It is important to note that average body weight, and therefore tractive power, given in the table below (Table 7.33) are most likely higher than what should be expected for Bronze Age specimens, especially for oxen (cf. Renger 1990, 269, consider also the discussion of traditional cattle breeds in the Middle East given by Borowski 1998, 71-77). Since an ard generates a shallower cut than the modern turnplough, the former requires less power to use. A turnplough may require a draft pull in excess of 200 kg (Goe and McDowell 1980, 3-5 and Tables 1 and 2, Stout 1990, 83-85 and Tables II.16 and II.18).

	Body weight (kg)	Draft as percentage of body weight	Draft (kg)	Speed (km/h)
Horse	500	10-12	50-63	2.4-4.0
Donkey	190	10-16	19-30	2.4-4.0
Mule	200	10-16	20-32	2.4-4.0
Oxen	450	10-14	45-64	2.4-4.0

Table 7.33: Tractive capability of principal draught animals (adapted from Goe & McDowell 1980, 38 & Table 16. See also Stout 1990, 86 & Table II.19; Palmer 1998, Table 5)

Modern varieties of the *maresha*, a type of ard common in Ethiopia, employs a sharpened iron share and typically requires a draft pull of 100 kg (Gebregziabher *et al.* 2006, 133-134 with further references). Lower values are found in equatorial Africa (Goe and McDowell 1980, Table 2), and even more so for traditional ards in Bangladesh, namely around 22-26 kg (Fuller and Aye 2012, 329-330 and Table 326 with further references). While these numbers are subject to a wide variety of regionally specific variables, they illustrate that a pair of draught oxen with a combined draft pull of between 50-150 kg are very capable of pulling an ard (consider in this respect e.g. the more recent use of single horses for ploughing, and also the occasional use of only one bull for traction in Eastern Arabia, cf. Potts 1994, 163). Donkeys and mules were occasionally used for tillage in the Bronze Age, yet their lesser body weight compared to oxen significantly constrains their use for more demanding types of work, further compounded by the potentially smaller size of Bronze Age specimens (which also impacts on attrition rates after prolonged periods of work). The general picture emerging from the texts seems to imply that oxen or cattle were, by far, the preferred option (e.g. Heimpel 1995, 91-93, for similar observations from traditional Jordanian agriculture, see Palmer 1998, 142, for Tunisia, see Anderson 2014b, 33).

Accordingly, our discussion of tilling and sowing capacity will focus on oxen in particular. The average plough team at Middle Bronze Age Mari maintained an average 10-15 workers and 6-8 draught oxen (van Koppen 2001, 477-478 and n.

425). Where information on team composition is available, these invariably comprised only one steerer of the plough (Akk. *mukīl epinni* or *mukīlu*), which, logically, suggests that the work of one such plough team centred on one plough only (see for diverging views on this matter van Koppen 2001, 468 and 485-486 Table 461 and 462, also van Driel 2000a, 287-288). Plough teams in documentation from the Third Dynasty of Ur include the same number of draught oxen. A variety of figures are given in the literature for the actual number of oxen used for pulling a plough, however (Weszeli 2008, 394-395 with further references). The typical 'yoke' or 'team' (Sum. ^{giš}erin2, Akk. *ṣimdu*) of the Third Dynasty of Ur consisted of four oxen (Widell *et al.* 2013a, 63). Wiggermann asserts that Middle Assyrian plough teams in the central Balīkh employed only two oxen to pull a plough, an arrangement also seen in Neo-Assyrian times (Wiggermann 2000, 189-190). As we have seen, the traction needed to pull an ard rarely requires more than two oxen in most cases, yet if accounting for a smaller body size, two pairs may be desirable. The loamy and heavier soil of the southern alluvium may have been harder to till than upland soils, but disagreement among various sources may also be a consequence of scribal practice and managerial preference (Widell *et al.* 2013a, 63-64). Another variable to consider is the need for regular replacements (Halstead 2014, 49-50). Heimpel's study of plough teams at Umma suggests a draught oxen fatality rate of some 10-15% per year (Heimpel 1995, 132). Prosperous farmers of the early 20th century CE Greece and the Balkans often used two or three pairs of draught oxen in rotation, with each pair pulling the plough for a mere two hours (as opposed to the daily five hours often seen for solitary pairs on smaller farms). This arrangement would allow for an average 0.3 hectare tilled per day while reducing attrition rates (Halstead 2014, 53). Assuming similar practices to have been in place in the Bronze Age Jazīrah and in the alluvium is further substantiated when turning to the overall extent of agricultural land tilled by a plough-team.

	Number of oxen	Draught tillage (ha/year)	Manual (ha/year)	Reference
Northern Greece (20th cent. CE)	2	10 ha	3 ha	Halstead 1995, 15
Southern Italy (19th century CE)	2	10 ha	2-4 ha	Delille 1977, 128-129
Central Greece (18th cent. CE)	6	20 ha (6.67 ha)	-	Asdrakhas 1988, 188
Ottoman Macedonia (16th cent. CE)	2	9 ha	-	Moskof 1979, 60
Byzantine Greece (13th cent. CE)	2	5-7 ha	-	Davies 2004, 116
Byzantine Greece (11-12th cent. CE)	2	8-15 ha	2-4 ha	Harvey 1989, 50-51
Middle Tigris (12th cent. BCE)	10	72 ha (14.4 ha)	-	Freydank 1994, 26
Middle Euphrates (18th cent. BCE)	6	18-30 ha (6-10 ha)	-	Lafont 2000, 139
Middle Euphrates (18th cent. BCE)	6	25-35 ha (8.33-11.67 ha)	-	van Koppen 2001, 462
Southern Iraq (21st cent. BCE)	6	32.5-45.5 ha (10.83-15.17 ha)	-	Maekawa 1987, 41-44

Table 7.34: Average tillage capacity of a pair of oxen or one adult human

While such figures vary substantially (van Koppen 2001, 462-463 and Appendix 464), information emerging from the letter ARM 26/1 indicates that managers in the Middle Euphrates Valley appear to be working with an average 70-100 *ikû* of agricultural land per plough team, thus c. 25-35 ha (van Koppen 2001, 462, Mori 2007, 48-49, also van Driel 2000a, 287-289). A lower figure is supplied by Lafont, namely 50-80 *ikû*, or 18-30 ha (Lafont 2000, 139). Slightly higher values are attested for the alluvium under the Third Dynasty of Ur, e.g. the common unit of 5 to 7 bur_2 equal to 32.5-45.5 hectares (e.g. discussion by van Driel 2000b, 86-87, Maekawa 1987, 41-44). We can juxtapose these figures with historical and ethnographic examples of plot sizes traditionally tilled by one pair of oxen from across the Mediterranean Basin (drawing on Halstead 2014, 42-43). While especially Bronze

Age values should be approached with some caution, the above table (Table 7.34) suggests a fairly well defined range up until present day.

7.4 Ploughing and sowing

The plough teams were charged with the tilling and preparation of the soil for the sowing of winter crops, initiated with the coming of the autumn and winter rains. As precipitation across much of the region is subject to substantial inter-annual variation, ploughing and sowing could extend from October to January (Hopkins 1997, 26-27, Palmer 1998, 143, also the informative account by Halstead 2014, 21-26). Tilling and sowing with the ard involves several rounds of ploughing (Hruška 2007, 60-61). The first ploughing breaks up the fallow, and is often complemented by manual hoeing to dig out weeds or break clods, and potentially by further rounds of ploughing and harrowing. Sowing, either by furrow or broadcasting, is followed by a second ploughing to cover up the seeds before these are consumed by pests (especially birds, cf. von der Osten-Sacken 1999). Ploughing was a demanding task, in particular the breaking of fallow or stubble. These are further compounded by topography and soil composition. Stony or irregular fields in upland areas impede ploughing speed, and may be tilled manually. Within the Mediterranean and the Middle East, a fairly uniform capacity range for tilling with a pair of oxen can be established as falling between 0.1 to 0.3 ha/day (Halstead 1995, 13, 2014, 34-35, Palmer 1998). Tilling of stony or heavy soil will usually not exceed 0.1 h/day, while figures close to 0.3 ha/day are uncommon and dependent upon very favourable conditions. Halstead observes that a pair of oxen will usually work no more than 0.2-0.3 ha/day without severely impacting upon their overall work performance, and even 0.3 ha/day may be a fairly optimistic estimate (Halstead 2014, 36-39).

Once sown, the cultivated fields required relatively little maintenance throughout the winter and early spring. The principal task was weeding and guarding the fields against pests, e.g. foraging animals such as gazelles and birds (e.g. in Turkey, see Hillman 1984, 117, for a survey of the Middle Bronze Age textual sources, see Wasserman 1999). Tilling may have been carried out elsewhere, however. Fallow fields are commonly ploughed several times within a single agricultural year. Traditional agriculture - in northern Jordan, for example - operates with both long (c. 18 months) and short (c. 10 months) fallow, the latter in rotation with summer cropping. Here, a first ploughing is undertaken in late summer after the stubble has been grazed, followed by multiple rounds of ploughing in late winter and early spring

(Palmer 1998, 149). In Greece, cultivated fallow with up to five rounds of ploughing within a year was considered ideal (Halstead 2014, 199-201).

7.4.1 Sowing rates

Autumn and early winter ploughing was undertaken in preparation for the sowing of winter crops. To offer some historical context to benchmark figures discussed earlier (4.2.1.4), let us here briefly consider sowing rates relative to surface extent, to review the average amount of seed used to cultivate a field. The literature on sowing rates and, more specifically, on seed-to-yield ratios in the Ancient Near East is abundant, yet complicated by the very wide range of factors that should be taken into account when assessing the relationship between sowing and yield, e.g. environmental variables, cultural tradition, dry-farming as opposed to irrigation, etc. (for a general discussion, see Deckers and Riehl 2008, 176-179, for interpretations of the textual record, see Postgate 1984a). I limit myself here to a survey of common sowing rates appearing in the textual record from the Middle and Late Bronze Age Jazīrah, and subsequently discuss these figures with reference to ethnographic observations (cf. Table 7.35). The latter, equally, display a good deal of variation, however, and it can be hard to establish a formal set of practical norms (consider the discussion given by Halstead 2014, 28-31).

There are relatively few references to common sowing rates from the Middle Bronze Age Jazīrah. At Mari, the letter ARM XXIII 466 gives 45 or 50 *qa/ikû* (correct the first number given by van Koppen 2001, 484), equal to some 80-90 kg/ha. Reculeau has recently reviewed and substantiated the generally applicable sowing rate of 30 *qa/ikû* for barley and 20 *qa/ikû* for wheat for the Middle Assyrian period (Reculeau 2011, 110-114 with further references). While it is not possible to offer a secure absolute value for Middle Assyrian capacity measures, this should correspond to a range between 43.4-86.6 kg/ha. Similarly, if assuming the *imēru* surface measure employed at Nuzi to equal 1.8 ha or five *ikû*, (cf. Powell 1990, 485), the average sowing rate of one donkey-load (Akk. *emāru*) would yield a range of 28.8-57.7 kg/ha. Lower Bronze Age figures may imply a preference for furrow sowing rather than broadcasting (but see comments in Halstead 2014, 30-31). The latter practice is attested, however, e.g. in a letter from Mari, which alludes to sowing 'in furrows' (Akk. *šer'u*) and 'by scatter' (Akk. *siphu*) of sesame (ARM 27, Text 3, cf. Birot 1993, 44-45). Furrow sowing can be seen in traditional agriculture also in more recent times, e.g. eastern Turkey (cf. Postgate 1994, 168, but see comments by Hillman 1984, 116-117), and is much common in Asia, as this mode of planting facilitates weeding (Maekawa 1984, 89, consider also discussion of Jordanian sowing practice, cf. Palmer 1994, 127, on sowing practices in the Mediterranean, see Halstead 2014, 28-31). In conjunction with our discussion of overall organisational scale in Chapter 9, a basic understanding of the needs for sowing seed will serve to contextualise overall production figures.

	Sowing rate (kg/ha)	**Reference**
North Jordan (upland) (20th cent. CE)	99.75	Palmer 1994, 98
North Jordan (plains) (20th cent. CE)	117.68	Palmer 1994, 98
Aşvan, Turkey (20th cent. CE)	50-150	Hillman 1973, 237 and App. 231
Northern Iraq (13th cent. BCE)	43.3-86.6	Reculeau 2011, 110-114
Middle Euphrates (18th cent. BCE)	81.25-90.28	van Koppen 2001, 484
South Iraq (21st cent. BCE)	24-36	Postgate 1984a, 100

Table 7.35: Sowing rates for barley
(Bronze Age examples according to a range of 1 *qa* = 0.8-1.6 litres)

7.5 Harvest

As in any other agricultural economy, the harvest of cereals comprised one of the single busiest events of the agricultural cycle (Postgate 1994, 169-170, Durand 1998, 658-659). Harvest encompasses several operational stages, which are considered here with regards to reaping, threshing and winnowing, transport, and storage. I discuss each of these steps in turn, focusing primarily on the manner and amount of labour involved. I limit myself to discussing the harvest of winter crops, namely cereals and legumes, but it should be noted that several rounds of harvesting took place within a single agricultural year. The harvest of winter crops, i.e. cereals and legumes planted in late autumn and early winter generally takes place in May and early June in the Jazīrah and adjoining piedmonts. Summer crops, of which sesame appears to have been the only extensively cultivated taxon, were planted in spring and reaped in late summer or early autumn. By September, a variety of fruit crops began to ripen, first fig, then grape, and finally olive. All of these stages of harvesting and storing crops were characterised by time stress and corresponding need for intensive labour input, variables that can be rewardingly illustrated in the case of the spring harvest.

7.5.1 Reaping

The first stage of the harvest is the retrieval of the mature crop, preliminary drying of straw, and transport to the threshing floor. The reaping of cereals could be undertaken in several ways. Archaeobotanical evidence suggests use of sickles for reaping (Akk. *eṣēdu*), e.g. in the Khabūr (Wasylikowa and Koliński 2013, 287), but some crops, e.g. sesame, were uprooted (Akk. *nasāhu*) (Mori 2007, 46). By ethnographic comparison, either method is dependent on functional and sometimes cultural preferences, and rarely a consequence of plant taxa alone (Murray 2000, 520-522, Halstead 2014, 77-80, Anderson and Sigaut 2014). Sesame is typically uprooted because of its low height, shrubby stature, and the even distribution of the seedpods. Many of the legumes display similar morphological traits, which make cutting more tedious and less effective in terms of yield. While slower than modern reaping implements, uprooting is not markedly inferior to cutting with stone tools (Anderson and Whittaker 2014b). Cereals are most often cut (Hillman 1984, 119), but uprooting may be preferred to increase the amount of straw that can be retrieved (regular uprooting of pulses and preferential uprooting of cereals can be observed in modern Jordan, cf. Palmer 2001, 625).q

The speed with which a given size of agricultural land can be reaped is an essential variable for understanding the constraints on pre-mechanised agriculture. While dependent both on labour availability, tools, cultivar, soil type and environment, average values for the area of land that can be harvested by one person are broadly comparable throughout the Mediterranean and the Middle East, as demonstrated in the table below (Table 7.36). Accounting for a work force including both genders of all ages, Padgham operates with an average reaping rate of 0.04 ha/person/day in his analysis of Late Bronze Age economies of the Eastern Mediterranean (Padgham 2014, 40). The latter figure further integrates technological constraints, namely sickles made from wood and stone, copper, or bronze (modern examples in the above table invariably rely on iron sickles).

	Area person/day	Area person/harvest cycle	Reference
Northern Greece (20th cent. CE)	0.1 ha	1-2 ha	Halstead 1995, 16
Amorgos (20th cent. CE)	-	1.5 ha	Halstead and Jones 1989, 47
Karpathos (20th cent. CE)	0.03-0.1 ha	1 ha	Halstead and Jones 1989, 47
Northern Jordan (20th cent. CE)	0.05-0.1 ha	-	Palmer 1998, 150-151
Balīkh Valley (13th cent. BCE)	-	1.44 ha	Wiggermann 2000, 189
Middle Khabūr (18th cent. BCE)	-	0.36 ha	van Koppen 2001, 500
Southern Iraq (21st cent. BCE)	0.18 ha	-	van Driel 2000a, 269

Table 7.36: Reaping rates per day and per harvest season

Sickles utilising chipped stone implements or sickles made from copper or bronze impede significantly upon reaping speed and efficiency in comparison to iron (Korobkova 1981, 339-344, Anderson and Whittaker 2014b, also Halstead 2014, 114-121). Copper and bronze sickles appear regularly in the textual record from the Middle Bronze Age, but stone implements remained in use throughout most periods in Egypt (Murray 2000, 520-521), and a similarly diverse set of tools is also in evidence for the Bronze Age Bliād al-Šām and the Tigris-Euphrates drainage (Moorey 1994, 61-64, Shimelmitz and Zuckerman 2014).

Time is the essential variable of the harvest. Yield is dependent on the state of ripeness, as the mature crop will eventually shed its seeds and so heighten grain loss during reaping. Animals as well as humans may prey upon the grain if sheaved and left in the fields to dry, and transport to the threshing floor may incur further grain loss if the crop is too ripe. In Greece and Turkey, reaping and transport of cereals and pulses commonly take place in the earliest or latest hours of the day as increased humidity prevents shedding (Halstead 2014, 68-71, Hillman 1984, 121). When combining the predominance of barley with an arid climate and consequently shortened period of ripening, not to mention lower reaping output per person due to technological constraints, the time stress commonly observed in traditional Mediterranean harvest cycles can hardly be overemphasised when turning to the Bronze Age Jazīrah (e.g. Halstead 2014, 120-121). A sense of urgency plays out in numerous letters, e.g. from Qaṭṭarā, where Iltani presents a plea for the speedy reaping of the fields of neighbouring villages:

> "To my lord, say, thus (speaks) Iltāni, your servant: They have assigned the fields of the palace and of my lord's (female) servants for reaping (Akk. *eṣēdu*), but they have not assigned the fields of (the village of) Badrum and the fields of (the village of) Yašibatum. I wrote to Nannabatani and Inib-Šamaš (and) they said: "Write(?) to the king." My lord knows that their yield is getting smaller every year, so let my lord write that they may assign the fields for reaping. Let them not hold back the pack-donkeys of the fields from him." (OBTR 156)

The critical importance of securing sufficient labour is borne out also in the correspondence of the governors of Qaṭṭunan, a town on the Middle Khabūr subordinate to the kings of Mari. During the reign of Zimri-Lim, the town experienced both locust swarms and a subsequent lack of labour to reap what the insects had not eaten (Birot 1993, 9-10, Heimpel 1996, see summary in van Koppen 2001, 496-501). In an excerpt from one of several letters touching on these matters, the governor, Zakira-hammu writes:

> "The locusts ate the grain of the district and the extras (Sum. lu_2-didli) and hirelings (Akk. *agru*) who earn their living and can eat at the time of the harvest. Earnings are made for harvest in the district. Extras left their homes here at night and went to Šubartu to earn a living." (ARM 27, Text 26 r. 2-9)

To remedy this situation, Zakira-hammu pleaded for workers and cattle to be sent from the south to assist with the reaping and trampling, but it is interesting to note that local authorities relied also on hired labour (Akk. *agru*), and further that these could subsequently move north, likely into the Khabūr Basin, in search for work. That labour shortage during harvest was a recurring problem is illustrated some years later, where Zakira-hammu once again spells out the need for additional hands (for the historical context, see again van Koppen 2001, 496-501):

> "Now, this year, 900 *ikû* of palace fields are sown, and out of the 900 *ikû* of fields I calculated that palace and commoners, if they work hard all day and all night, will harvest 400 *ikû* of fields, and the remaining 500 *ikû* of fields will be abandoned without harvesting. Now, my lord must give instructions and let them equip and dispatch troops to me to harvest the 500 *ikû* of field, and the grain must be gathered quickly, at the proper time. If not, if my lord does not send me troops, the grain of the palace will waste away." (ARM 27, Text 102 v. 12-19 r. 1-6)

After reaping, a variety of factors help to decide if sheaves should be left in the field to dry. While field storage for up to several weeks is common in upland parts of the Mediterranean Basin, drying of crops in the field is generally confined to much shorter periods in areas at lower altitude or in more arid regions (Hillman 1984, 120, Halstead 2014, 89-90). Iltani's closing plea for pack-donkeys (Sum. anše-gun$_2$) stipulates the need to transport the harvest to the threshing floor rather quickly, and further suggests that means of transport were not in ample supply.

7.5.2 Threshing

Following reaping and initial drying of the crop, the harvest was gathered in for threshing. Threshing constitutes the initial stage of cereal processing following reaping, and is undertaken to separate the spikelet, and ultimately the grain, from the straw of the plant. Threshing is generally easier when the crop is dry and brittle. In cooler regions, this is often achieved through preliminary drying of harvested crop in sheaves on the field. In arid environments, e.g. in the Jazīrah and adjoining regions, such precautions would have been less critical. To achieve a drier crop, threshing may also be confined to mid-day during the harvest season, thus allowing farmers to reap crops in the morning and evening hours (Halstead 2014, 127-128). Some distinction in the manner of processing of various crops should be noted. Where bulk amounts of cereal crops are typically threshed by trampling, smaller amounts of e.g. legumes could be hand-threshed, either by beating with a stick or through lashing (e.g. Padgham 2014, 41-43, Halstead 2014, 136-151, Hillman 1984, 121-123). Lastly, threshing of the harvest comprises a more extensive set of actions than the mere initial preparation of cereals for storage and consumption. Apart from the considerable workload associated with gathering, threshing, and winnowing cereals, the place of threshing also forms the social locus for dividing and accounting for agricultural resources (Postgate 1994, 169).

7.5.2.1 Threshing floors

Archaeologically, threshing floors (Sum. kislah, Akk. *maškānu*) are attested throughout the Mediterranean and the Middle East, though mainly in rocky areas or in areas with low sedimentation or erosion, e.g. the Sinai or the highlands of Yemen (Wilkinson 2003, 57) or Cyprus (Whittaker 2003). A preference for the less durable stamped earthen surface may explain the lack of archaeological evidence for threshing floors from the Jazīrah and the alluvial south (Civil 1994, 93-94, note also the preference for paved floors in the uplands as contrasted to stamped floors in the lowlands in Greece, cf. Halstead 2014, 149). The writing of Akk. *maškānu*, Middle

Bronze Age 𒆠𒌓 (KI-UD) or Early Bronze 𒆠𒋤 (KI-SU$_7$) may also mean "empty lot" (Akk. *nidûtu*), suggesting that threshing floors on the alluvial plain may have comprised little more than a cleared stretch of land close to the fields. In The Farmer's Instructions, a brief treatise on agricultural practices dating to the late Old Babylonian Period, no further directions to the laying out of a threshing floor are given besides stipulations to clear and level the ground (FI l. 90-94). A letter from Mari suggests that Sum. kislah may be used to refer to an actual grain storage, rather than a plot exclusively for threshing (LAPO 16: 215 with further references; see also Stol 2004, 679-680). Eidem proposes a similar interpretation by ethnographic analogy to the Luristani *qala* in evidence from Šušarrā (Watson 1979, 40, cf. Eidem 1992, 31), yet most references indicate that threshing of the grain could be undertaken with little preparation of the surface, here in a letter to Zimri-Lim of Mari (cf. Durand 1998, 662):

> "To my lord, say, thus Kibri-Dagan, (your) servant: Dagan and Ikrub-El keep you! The city of Terqa and the district are well. Another (matter); I have had the grain of the palace that was located at the mouth (of the canal) reaped (Akk. *eṣēdu*) and I chose a good site for a threshing floor. The field (Sum. u$_3$-sal) I irrigated with water and in like manner I gathered all of the grain from (along) the canal. Thus, with respect to the gathering of the grain of the palace from the district, I am not neglectful." (ARM 3, Text 31)

In administrative texts, threshing floors can be associated with various physical features, for example at Tuttul, where several examples are related to the gates, e.g. "the Gate of Dagan" (kislah *bāb Dagan*) or "the Gate of the City" (kislah *bāb āli*). A similar arrangement is found in modern times as well, for example at Jerusalem (Dalman 1928-42, Vol. III 67-74). That Akk. *maškānu* maintained the associated meaning of 'empty lot' may in part explain its regular use in administrative documents from Šehnā related to the production of beer. Here, *maškānu* designated the open space in which barley was laid out to sprout into malt (van de Mieroop 1994, 315). Procurements from threshing floors in the hinterland are often referred to by settlement, thus for example "threshing floor of Ṣerdā" (kislah *Ṣerdā*) at Tuttul (KTT 120). The same structure appears at Šušarrā, as evidenced in a series of texts relating the receipt of cereals and legumes from threshing floors of towns in the surrounding plain of Utûm (Eidem 1992, 31-33). Threshing floors here appear to be communal institutions, not exclusively used by the palace or any other discrete economic or political organisation, which is the case also in ethnographic literature (Dalman 1928-42, III 69-74). Village threshing floors rather constituted the point where the harvest that later found its way to the palatial storage was gathered and checked. The same point may be inferred from the delivery of grain at Tuttul. Here, the three farming managers responsible for the delivery each bring shares from the same threshing floors (for example, all three bring part of their yield from the threshing floor of Ṣerdā, cf. KTT 120), a feat which may underscore their relatively independent status in relation to institutional management (cf. van Koppen 2001, 481). Scant evidence of comparable practices can be found at Qaṭṭarā, where a text mentions the delivery of barley to the palace storage from the threshing floor "of Qaṭṭarā" (OBTR 235).

7.5.2.2 Trampling and threshing sledges

The existence of threshing floors in the Bronze Age may also be inferred from assemblages of worked flint blades used for threshing sledges, whose flint implements obtain a highly distinctive wear pattern (Whallon 1978, Anderson and Whittaker 2014a). Threshing sledges are also attested iconographically in seal impressions from 4th millennium BCE Arslantepe in the Upper Euphrates valley (Littauer *et al.* 1990), while petrographic analysis has served to establish the use of threshing sledges in the Mosul region in the beginning of the 3rd millennium BCE (Anderson and Inizan 1994, Anderson *et al.* 2006). Flint assemblages may likewise be indicative of threshing sledges in the southern alluvium (Adams 1975).

Though threshing sledges were then clearly known and used already at the beginning of the Bronze Age, they rarely appear in texts from the Jazīrah or further beyond. Several references to this device occur in the south (Salonen 1968, 170-177). Another common practice seems to have been to let oxen trample the grain to separate the seeds from the husk (as is common also today in much of the Mediterranean and Middle East, e.g. Turkey, cf. Hillman 1984, 123, in Greece, cf. Halstead 2014, 136-151). Provisions from the Code of Hammurabi allude to the use also of donkeys or even goats for trampling (Akk. *diāšu*) harvested grain (CH §268-270). Reaping generally took up a more substantial part of the workforce than threshing, and oxen could significantly speed up the latter part of the process (Halstead 2014, 170-173). It is hard to quantify work rates for threshing, but an estimate from Iran for threshing wheat with oxen suggests some 25-33 kg/hr (Watson 1979, 82), while figures for trampling by humans lie slightly lower, perhaps at a 100-300 kg/person/day (Halstead 2014, 168). Finding workers and oxen for threshing and trampling is richly elaborated upon in several qathe Middle Bronze Age. Thus a letter from Yaqqim-Addu, an official attending to the threshing upstream from Mari, who is reluctant to commandeer labour from local villages while his king has taken away the men on a campaign (Sasson 2015, 59-60):

> "At the same time, Yasim-sumu told my lord: "Are the women supposed to thresh the grain of the palace? My lord should call upon (Akk. *nasāku*) the commoners' oxen and have them thresh the grain of the palace." My lord answered: "Are women more inept than the artisans, smiths, weavers, and fullers who I assign to carry in the grain? Surely they can thresh the grain of the palace." (ARM 14, Text 48 v. 11-18)

Finding people less efficient than oxen, Yasim-sumu eventually went to greater lengths. On the reverse of the tablet, he explains how he found oxen from local settlements to do the threshing:

> "Since the commoners had heard of the exemption of their property from my lord's own mouth, I was cautious and did not lay hands upon the oxen of the commoners. I did (however) allocate 20 oxen of the elders who remain to guard Saggaratum, They have threshed and brought in (the grain of) one threshing floor of the palace and they immediately undertook threshing (the grain of) another threshing floor. In Dur-Yahdun-Lim I likewise allocated 30 oxen of the elders who remain to guard the fortress, and they have threshed and brought in (the grain of) one threshing floor." (ARM 14, Text 48 r. 3-11)

A very similar situation emerges in contemporary correspondence from Ṭabatum, just south of the Khabūr Basin (cf. Ziegler 2011, 30-32 and Text C). Here, the local master informs his king that he has no cattle to trample the grain on the threshing floor, and asks the latter to write to the local townsmen in order to use their oxen. While institutional holdings of draught oxen were almost certainly more substantial than those of individual villagers in any given time or place, the ability to draw on communal resources in times of need, especially during harvest time, is borne out quite clearly by the above excerpts. Halstead has suggested that the use of animals and, even more so, sledges, for threshing may have been a luxury of the elevated few in the past (Halstead 2014, 175-176), but the examples cited here illustrates firstly that draught animal power was not an exclusive characteristic of the institutional household, and second that authorities had to negotiate their way when drawing in resources from their surrounding community. Lack of labour during harvest time was a recurring problem, and solving this problem often required collective cooperation across otherwise well established social boundaries, i.e. between palace and community and individual.

7.5.3 Winnowing

Following threshing, the husked grain was separated from the chaff by winnowing. The process of winnowing may involve either reed baskets or winnowing forks or shovels, but the main element is to use the wind to separate chaff and spikelet remains from the heavier grains. Barley and glume wheats, following Hillman's observations from Turkey, rarely require more than one round of winnowing (Hillman 1984, 124). Only a few references to winnowing (Akk. *zarû*) are available from the Middle Bronze Age Jazīrah. As we would expect, these are all closely related to the threshing floors, e.g. in a side-note in a letter to Iltani at Qaṭṭarā (OBTR 163). Back at Ṭabatum, Iddin-Dagan's request to use the oxen of the local villagers for trampling grain is accompanied by a request for 20 men to do the winnowing:

> "I have no troops who can winnow (Akk. *zarû*) the grain. My lord must send me 20 men who can winnow the grain in order for me to quickly finish (work on) the threshing floor of the palace. [I have no] cattle that can trample (Akk. *diāšu*) the threshing floor of the palace. Cattle of the commoners are available in Ṭabatum. My lord must write the inhabitants of [the town] so their cattle can trample the threshing floor of the [palace]" (A.2157 v. 7-17 r. 1-6)

Provided with suitable working conditions, namely an open, dry area and a light breeze, the rate of winnowing lies at an output rate of perhaps 50-100 kg/hour (Halstead 2014, 169, Russell 1988, 124). In the first lines of Iddin-Dagan's letter, he mentions a total yield of some 144,000 *qa*, which (if we assume that he refers to spikelets and not sheaves) would take up five to ten full working days for the requested 20 men to winnow. While winnowing is less of an urgency than reaping and threshing, it can involve considerable risk as it is very dependent on favourable weather conditions (Halstead 2014, 169). Winnowing is followed by coarse sieving and, potentially, by a variety of cleaning processes that varies with respect to cultural and environmental preference. Contrary to widespread belief, parching of hulled grains is not mandatory to dehusking (Peña-Chocarro and Zapata 2014, also Nesbitt and Samuel 1996). Grain being transported from the threshing floors to storage is occasionally alluded to in Mari letters as 'clean' (Akk. *zakūtu*) (e.g. at Qaṭṭunan, cf. ARM 27, Text 37. See also discussion of ARM 6, Text 37 in Durand 1998, 326-327), but this does not argue forcefully against the archaeologically attested practice of storing barley and emmer in spikelet form (e.g. Rattenborg 2016). We should further note that husked grain is less vulnerable to pests and mold (Halstead 2014, 157-158). The principal remaining task left for us to consider was the division and transport of the harvest to a more permanent storage.

7.6 Transport

Storing the fruits of the harvest would have caused the most significant strain on draught animals and other means of transportation. As a means of illustration, KTT 120 gives a total of some 268,800 *qa* of grain taken from Ṣerdā to the storage at

Tuttul, implying the hauling of more than 200 tonnes of grain over a distance of some 30 kilometres. By donkey, we would require 2,500 loads, by ox-cart at the very least 200. This is an extreme example, at least within the present dataset, but it helps to clarify the immense needs for transportation once the reaping, threshing, and winnowing of the grain had been completed. Transport of course relates to several other elements of the *chaîne operatoire* sketched in the preceding sections apart from the final movement of the harvest to permanent storage facilities. Gathering natural resources, for example firewood, equally required some means of transportation (at least in the case of the 57 talents, or 1.5 tonnes of firewood seen at Šušarrā, cf. Sh 2, Text 45). Sowing seed, within the range of rates given earlier, necessitated perhaps a donkey-load per hectare, and goes some way to explain the presence of donkeys in plough-teams. Thus for example a servant of Iltani on dispositions during autumn ploughing:

> "Now, six pack-donkeys (Sum. anše-gun$_2$) must deliver grain regularly and the oxen cannot be idle. They must plough." (OBTR 137 l. 24-27)

When turning to transportation within agricultural communities, we should consider some more universal aspects of common logistical needs (e.g. Crossley *et al.* 2009, 1-46 and Figure 42). In non-mechanised agricultural communities of contemporary developing nations, transportation needs relate overwhelmingly to short-distance (<5 km) trips between housing and fields (e.g. Adeoti 1993). Less than ten per cent of trips undertaken exceed a distance of 20 km, and only a fraction of these will involve transport of bulk commodities. These trends, in turn, impact upon the manner of transportation employed. Human transport has a limited range and loading capacity compared to draught animals used either for carrying or hauling goods (Table 7.37), but the various modes of transport should logically be weighed against utilisation frequency and maintenance cost. Rural communities employ a diverse variety of these modes of transportation, depending on topography, technology, functional needs, and cultural preferences. The point to stress when discussing movement in the Middle Bronze Age is the relevance of specific means of transportation to specific agricultural tasks. Carts, for example, are more costly to maintain than draught animals, and serve a more limited number of purposes than, say, pack-donkeys. While it is hard to formalise the costs of keeping a cart or wagon in a Bronze Age community, we can certainly say that keeping a cart required some degree of skilled craftsmanship and access to a range of spare parts and lubricants.

Transportation mode	Load (kg)	Speed (km/h)	Range (km/day)	Capacity (t/km/h)
Human	30	4-5	15-20	0.12
Wheelbarrow	90	3-4	5-6	0.35
Handcart (1 person)	200	3-4	10-12	0.80
Donkey	50-80	4-5	20	0.30
Ox-drawn sledge (2 animals)	250	2-3	15	0.75
Donkey cart (1 animal)	300	3-4	20	1.10
Ox cart (2 animals)	900	3-4	20	3.20

Table 7.37: Comparison of various modes of rural transportation (adapted from Dennis 1999, Table 1)

Middle Bronze Age Anatolian loan contracts, for example, occasionally included cart axles as a means of payment, demonstrating that replacement of crucial elements such as axles and wheels was both a costly and specialised undertaking (Balkan 1979). Carts further require traction, and draught animals required fodder (cf. 8.1.2). Considering the functional relationship between the extent of agricultural lands and the capacity of manual and draught-powered tilling, smaller land plots (<3 ha), as those common in texts relating to Bronze Age field sizes, would not have been able to support draught animals. In mid-20th century CE Hasanabad, a village in the Zagros, less than a third of the local sharecroppers owned two oxen, most of them relying on sharing of draught animals for ploughing and harrowing. Donkeys were equally few, and relied on primarily for transportation (Watson 1979, 67 and Table 64.61). In the Jazīrah, the presence of hollow ways around and in between ancient settlements can help us to sketch out some basic patterns of movement and transportation within rural communities (see Wilkinson 2003, 111-117 for a concise overview). The majority of linear hollows radiating from Bronze Age settlements extend to a radius of less than 3-5 kilometres, and constitute the remains of tracks between fields surrounding the settlement (Wilkinson 2003, 116-117). The fading out of most tracks beyond this point suggests, in accordance with the schematic spatial outline of Bronze Age rural communities given earlier, that hollow-ways were predominantly formed through movement between dwellings and fields, and through the movement of livestock to pasture beyond the fields (Casana 2013, 268-269, for a similar emphasis on local movement in a British context, see Aston 1985, 143-146).

7.6.1 Donkeys

Basic functional divisions between various means of transportation are harder to identify within the institutional household economy, however, as these held much more extensive flocks of draught animals. When Iltani stressed the need for pack-donkeys to be made available to the two villages outside of Qaṭṭarā, she also acknowledged that they were in high demand during harvest time. But then again, Ibal-Išhara who required six donkeys to carry sowing seed in the autumn returned carts (Sum. $^{\text{giš}}$mar-gid$_2$-da) to his mistress (OBTR 137). Overall, the letters from Qaṭṭarā seem to suggest that donkeys were, on the whole, the backbone both of agricultural (e.g. OBTR 145, 156) and commercial (e.g. OBTR 153, OBTR 306) transport in the 'Afār Plain, and in the Jazīrah more generally. “The means of your land is donkeys and carts. The means of my land is boats” says Hammurabi of Babylon in one Mari letter (ARM 26, Text 468). At Ašnakkum, the palace reared donkeys on a larger scale (OBTCB 13), and maintained a group of 5-7 pack donkeys (Sum. anše-gun$_2$) with regular issues of barley fodder (attested in early spring and summer, cf. OBTCB 15, 16, 21, and 27). A variety of donkey packs appear in fodder disbursements at Alalah, mostly counting limited numbers, yet we should note an issue given in ATaB 41.45, which lists barley and vetch for an approximate 30-40 donkeys. It is odd, however, that there are no numbers within the dataset to match the transportation needs of the several hundred tonnes of grain that would have been the outcome of an average harvest season (consider the discussion by Halstead 2014, 108-112 for a perspective on the transportation needs just for nucleated peasant families).

7.6.2 Carts

Carts are amply documented both in iconography and texts throughout the Bronze Age. From amongst these sources, it is possible to distinguish between the chariot, so often encountered in elite paraphernalia (Sum. giš-gigir, Akk. *narkabtu*), and the more commonplace cart (Sum. giš-mar-gid$_2$-da, Akk. *ereqqu*) used for hauling goods by animal traction. At Ašnakkum and Šušarrā we find occasional reference to the term *mayyaltu*, at the latter site at least another word for cart (Stol 1995, 185). Fodder for a group of six cart oxen, most likely working in spans of two, is accounted for at Tuttul, in KTT 131, 152, and 162 (8.1.1.1), dating to the early spring. Letters from Mari make reference to carts used to transport grain after reaping (ARM 26/1, Text 146) or threshing (ARM 3, Text 67). At Qaṭṭunan on the Khabūr River, one official was promised 30 carts to bring the harvested grain to the threshing floor, but received only 11 (ARM 27, Text 4). Vehicles less easily related to agricultural work also appear. The *mayyaltu* appearing at Ašnakkum as part of Yasmah-Addu's entourage is associated with six cart oxen (OBTCB 65 and 74), and should, if ignoring the possibility of an undetected plural, be likened to a large wagon. At Mari, the same term appears in an elite setting, and is likely a royal litter. The same connotation is not clearly borne out at Šušarrā, where 24 oxen are assigned to haul carts (Akk. *mayyaltu*) (Sh 2, Text 137). On a very general level, carts appear to have been of limited use in everyday agricultural work, and relatively rare outside of the institutional household (see for similar assertions with reference to the alluvium e.g. Civil 1994, 93-94). Yet they are regularly attested in plough-team rosters from Mari (e.g. van Koppen 2001, 493-495), where carts were both well made and sought after. Thus Išme-Dagan in a letter to his brother; "Mari carts are the best of the land. You must send a carpenter who constructs Mari carts to me." (ARM 4, Text 79 v. 8-13 r. 1-2). We should not expect carts to have been a common part of the inventory of an average peasant, but they do appear in epistolary sources. Zakira-hammu of Qaṭṭunan must rely on carts of the commoners to have grain transported to Qaṭṭunan for storage (ARM 27, Text 37), and a letter from Qaṭṭarā dating to the late 18^{th} cent. BCE mentions a cart belonging to a commoner (Akk. *muškenu*) (OBTR 280).

7.7 Rural storage

We have already discussed storage facilities located in urban communities (6.2.3), but we should review briefly some hints at rural storage and how these relate to agricultural infrastructures more generally. As discussed in the preceding chapter, various terms for grain storage appear in the dataset and distinguish between rural and urban storage structures. Central granaries, e.g. Akkadian *našpāku* or Sumerian i_3-dub were located within the settlement. 'Grain heaps' (Akk. *karû*, Sum. gur_7), in contrast, appear primarily in the rural countryside, and while they could hold significant quantities of grain (e.g. the more than 62,000 *qa*, or some 40 tonnes, taken from Ṣerdā in KTT 116) their physical characteristics may be of a more makeshift nature. At Ašnakkum, agricultural inspectors (Akk. *ebbu*) were present and tending to the grain-heaps (Sum. gur_7, Akk. *karû*) at the time of the payment of grain taxes (Akk. *šibšu*) (Lacambre and Millet Albà 2008b). These attestations fall primarily from high summer to early autumn, and suggest that grain stores were maintained in the countryside for months after the harvest, though with little hint at their scale (note that leaving sheaves in the field over much of the summer is also seen at Hasanabad, cf. Watson 1979, 78). Another means is the off-site storage of cereals in pits. Until recently, it was not uncommon to see cereals stored in earthen pits in a Mediterranean setting, e.g. in the Aegean (see the discussion by Halstead 2014, 158-163), and though no longer found in the Bilād al-Šām, they are still remembered as a means of hiding grain from Ottoman tax collectors (Anderson 2014a, 211, for Bronze Age urban examples, see e.g. Fairbairn and Omura 2013, Paulette 2015).

7.8 To reap what you sow: infrastructures of agricultural production

To conclude this chapter, I wish to focus first on the significance and magnitude of individual resource groups within the dataset, second on some basic infrastructural constraints relating to extensive crop cultivation, namely cereals, legumes, and sesame. These observations serve to contextualise our perspective on the agricultural segment of the institutional household economy in relation to the preceding and succeeding chapters, and I extrapolate further on these later. I have reviewed in some detail the particulars of individual groups of agricultural and horticultural produce that we could reasonably expect to appear in the administrative record. Notwithstanding the partial nature of the dataset, we should underscore the predominance of cereals and, in specific environmental settings, legumes in this respect. The scale of summer crop cultivation, i.e. sesame, is more elusive, but the few references to sesame seed point to an industry of significance. More demanding types of produce, e.g. vegetables, fruits, and nuts, do not appear at a scale or with a regularity suggestive of production beyond immediate household needs.

Though legumes constitute an important dietary supplement, the amounts appearing in the textual record are not impressive (7.2.2). Corresponding proportions have been gleaned from analyses of archaeobotanical samples from Brak and Mūzān in the Khabūr Basin, and point to a very modest scale of legume cultivation when viewed against cereal agriculture (Deckers and Riehl 2008, Table 3). A similarly modest emphasis on extensive legume cultivation is borne out in ethnographic literature, which suggests that legume cultivation may have been more at home in smaller and more fertile garden plots (for Greece, consider e.g. Halstead 2014, 201-

211, for western Iran, see Watson 1979, 74-77). Šušarrā, where the percentage of wheat and legumes is markedly higher, remains an exception in this respect, but if legumes were cultivated on a more extensive scale in the drier lowland plains, the dataset is unable to detect it. The overrepresentation of cereals and bitter vetch, e.g. at Alalah, may be a consequence of the written documentation available to us. But it is worth pondering for a moment the functional qualities of this pair both with respect to crop rotation patterns and their suitability to extensive cultivation strategies (consider especially Halstead 2014, 176-177). In bi-annual rotation or with interspersed periods of cultivated fallow, cereals and bitter vetch would have constituted the two basic bulk crops needed to support people and draught animals alike (these played a similarly important role until fairly recently in Greece, cf. Halstead 2014, 202-203). This pattern is much less obvious further east, however. Sesame, as hinted at above, was extensively cultivated in the summer months in some places, though a lot of some 260 *ikû,* as the one calculated for the entry at Mari, would hardly have taken up much of the aggregate surface utilised for the growing of winter crops.

Turning to the managerial infrastructure, we have seen that the institutional household economy relied on a material and technological complex that can be rewardingly compared to traditional agricultural practices within the wider Middle East and the Mediterranean Basin (e.g. Watson 1979, Palmer 1994, Halstead 2014). The relevance of this point is best illustrated through the relative agreement of e.g. labour input rates with reference to ploughing, sowing, reaping, and threshing, and implies that logistical constraints observable in ethnographic literature can certainly be applied also to a Middle Bronze Age context. I focus here specifically on the balance between animal traction (for ploughing) and human labour (for reaping). As Halstead has argued, infrastructures of traditional farming practices in the past were constrained by two seasonal bottlenecks; one the autumn and winter ploughing, the other the harvest of winter crops in late spring (e.g. discussion in Halstead 2014, 113-121). While the first could, at least in theory, extend over up to four months, from late September and into early January, the latter was confined to a maximum of six to seven weeks, yet probably no more than a month on most occasions, from the beginning of May to the beginning of June. Extending this window is possible to a certain extent, mainly through cultivation of a diversified set of crops, e.g. legumes, wheat, and barley. Since glume wheats are less prone to shed their grains immediately upon ripening, their widespread use throughout the settlements examined here may be a further means of countering time stress during the harvest. These variables should, however, be weighed first against the shorter period of seed maturation in the Jazīrah and adjoining regions, secondly the more or less exclusive focus on barley in institutional agriculture (see above).

When employing only manual labour, the required labour inputs for ploughing, sowing, and reaping are roughly in equilibrium. Cultivation in excess of basic subsistence needs for a nucleated family requires the use of draught animals, and introduces an infrastructural imbalance between land tilled and land that can be harvested. This is further compounded by fodder requirements for draught animals used, though the latter depends very much on prioritisation and work intensity. In village communities, shortages are commonly mediated through sharing or bartering draught power for human labour (e.g. in Iran, cf. Watson 1979, 67, in Greece, cf. Halstead 2014, 299). We have seen that the land tilled by a pair of plough oxen could average something like 0.2 ha/day or, using Middle Bronze Age figures for a team of 6-8 oxen, ca. 25-35 ha per sowing season. The average reaping capacity in the Bronze Age was probably less than 0.5 ha/person/cycle, a figure supported by ethnographic data (Padgham 2014, 40). Consequently, reaping the crop sown by a single plough-team would require 50-70 skilled and able adults. In reality, the necessary number of hands was probably higher, especially if considering the less efficient range of farming tools employed in the Bronze Age, not to mention setting aside labour for stacking, transport, and threshing. Thus, when Zakira-hammu of Qaṭṭunan had calculated that palace personnel and commoners, working day and night, could harvest only 400 of the 900 *ikû* that had been sown, and therefore asked his master for more workers, the sense of urgency should be weighed against the fact that he was asking for the collective workforce of a small town (ARM 27, Text 102. Also 7.5.1).

Turning from extensive agricultural practices of cultivation to more demanding types of crops, let us discuss a few points with regards to the scale of horticultural production. First, vegetables surely played a much more prominent role than the one implied by the administrative record. The appearance of alliaceous plants and the absence of, say, lettuce, in the Šehnā assemblage is, in all likelihood, a consequence of the administrative record's ties to what was *stored*, rather than what was produced. This implies that vegetables were not subjected to any sustained effort of accounting, and, consequently, an activity very much within the sphere of the palace household nucleus. Further to this point, consider the number of gardeners (Sum. lu_2 nu-giš-$kiri_6$, Akk. *nukarribu*) appearing in grain ration records. The table below summarises attestations found in the entire dataset. While present at most of the study sites, local numbers of gardeners do not suggest significant horticultural enterprises relative to the produce of cereal cultivation (Table 7.38). Second, let us turn to the cultivation of fruit crops and the maintenance of orchards. While impressive in its detail, preserved entries in the list of orchards found in ARM 22/1 329 account for some 30 individual lots extending over a modest total of 4-5 ha.

	Gardeners	Reference
Alalah	1	ATaB 41.53, 41.78
Tuttul	4	KTT 324, 325
Ašnakkum	4-5	OBTCB 12, 81, 82, 88
Šehnā	1-2?	Vincente 1991, Text 37 and 90

Table 7.38: Approximate number of gardeners (Sum. lu_2 nu-giš-$kiri_6$) at study sites

Included in this overview are some 450 fig trees, just over 100 apple trees (assuming the reading to be correct, cf. Kupper 1983, 531), a handful of pomegranates, and finally some 200 *mūšarī* (c. 0.72 ha) of grapevine, a number that should likely have been considerably higher. If this constitutes a substantial part of the horticultural basis for Zimri-Lim's palace (the individual entries appear to relate to tenant plots), then orchards related to the households considered here would have amounted to little more than a couple of *ikû* (say, 0.5-1 ha at best). As sketched above, the lack of historical references to grafting prior to the Iron Age would significantly narrow the number of perennials that could have been beneficially propagated in the Jazīrah, hence the dominance of fig and grape in the Mari records (the number of apple trees is less easy to explain). Overall, there is little to no evidence of fruit cultivation exceeding the needs of an extended household at any of the study sites considered here.

When juxtaposed with observations given in the preceding chapter, the above analysis underscores the magnitude of cereal agriculture relative to all other types of crops. While none of the study sites offers anything but haphazard documentation on annual yield, the scale that can be gleaned from various records suggests that cultivation of cereals, sesame, and fodder legumes significantly outranked legumes for human consumption and virtually all fruit and vegetable crops. Infrastructural constraints, namely tilling and reaping capacity, are more easily derived from the available documentation, and may be used to elaborate upon these observations. A common feature of cereals, sesame, and fodder legumes is that they lend themselves easily to extensive agricultural regimes, whereas the majority of legumes require increased amounts of water and better soils. The latter group is also more demanding in terms of labour input during reaping and threshing. I have argued that large-scale cultivation of most fruit crops would have been hampered by technological constraints with regards to propagation, but leaving this point aside, it is interesting to note that less demanding cultivars, e.g. fig, olive, and grape, do not appear at a scale that would suggest intensified horticultural practices within the institutional household economy. To conclude, textual evidence discussed in the present and preceding chapters suggest a marked differentiation in scale between the institutional management of cereals and a few other bulk crops on the one hand, and most supplementary crops on the other. This point will be further extrapolated with reference to livestock in the next chapter.

8 Lands of pasture

Beyond the settlement and the agricultural hinterland, we can now consider the structure and extent of animal husbandry and its role in relation to other segments of the institutional economy. Next to agriculture, livestock formed the other foundational economic field of subsistence for Bronze Age societies, and the two were closely and symbiotically intertwined, in terms of tradition, structure, and practical organisation (articles in Collins 2002, Arbuckle 2012). This section will then touch on a number of different, though interrelated aspects. We will review first the particular species of livestock found in the zooarchaeological and textual record with reference to ethnographic comparisons in order to outline their role within the institutional economy. Excurses will be made to situate various types of livestock in the context of the economic infrastructures of which they form part, e.g. in relation to rearing, grazing, breeding, exploitation, and consumption. I touch only marginally on the recent and extensive literature on the origins of animal domestication, as it is beyond the scope of the current chapter to comprehensively discuss these developments (e.g. Zeder *et al.* 2006, Larson and Burger 2013). Current research is revising critically perceptions of the process of domestication as a simple – and inevitable – transition from wild to domesticated species (Zeder 2008). Human management of animals has been shown to predate significantly the emergence of morphologically distinct domesticated taxa, e.g. for goat (Zeder and Hesse 2000, also Zeder 2006), and early examples of pig rearing largely bypass otherwise handy simplifications of wild and domestic species markers (Vigne *et al.* 2009). Another point to stress is the particular nature, in terms of scale and composition, of the organisations that we are concerned with here. Institutional households discussed in the following counted their livestock in the hundreds, if not thousands, in economic terms a world apart from the average rural household that might have held a couple dozen sheep, a donkey, and a pig (consider e.g. the discussion of small-scale Mediterranean livestock management by Halstead 2014, 289-294, for a perspective from Western Iran, see Watson 1979, 94-99). Finally, discussing livestock holdings within the institutional household relies on an occasionally haphazard body of documentation; most types of livestock enter into the managerial sphere illuminated by the administrative record only rarely, either when forming part of a transaction or a head count or when being fed grain from institutional storage. While the former is comparatively rare within the mass of texts produced annually, the latter generally occurs either as an expression of supplementary and temporary feeding (e.g. in late winter) or feeding for intensive meat production (e.g. for pigs and fowl). All of these factors place some limitations on the conclusions that can be drawn with regards to off-site livestock management, limitations which should be kept in mind throughout the present chapter.

I begin with the core triad of Ancient Near Eastern livestock, namely cattle, sheep, and goat, followed by sections on species that we can reasonably expect to have been exploited primarily for their meat, i.e. pig, fowl, and fish. Concluding these two main groups of livestock are sections on a few derived resource types, e.g. dairy products and meat. I do no justice to the procurement and processing of wool or hides, as a comprehensive review of this part of the livestock industry is both beyond the bounds of this chapter and our basic aims. The reader should, however, take note of the abundant recent literature on textile production in the Bronze Age Middle East and beyond (e.g. Michel and Nosch 2010, Strand and Nosch 2014, Nosch *et al.* 2014a, Nosch *et al.* 2014b). Having reviewed the various groups of livestock, the second part of the chapter discusses practices of fattening animals for consumption, as fattening forms an integrated part of most organisations under scrutiny here. The third and final section reviews infrastructures of herding and transhumance and their reach across the general region.

8.1 Cattle

Next to sheep and goat, cattle forms one of the principal elements of livestock economies of the Bronze Age Ancient Near East. As the region straddles a transition zone between early strands of the two main domesticated bovine species, namely taurine (*Bos taurus*) and zebu (*Bos indicus*), we should briefly review the current state of zooarchaeological research to decide on the types of bovine encompassed by the present dataset. Taurine cattle, the common variety of cattle in temperate climates, descends from Middle East populations of the wild aurochs (*Bos primigenius*), from which domesticated specimens were brought into Europe (Troy *et al.* 2001, Beja-Pereira *et al.* 2006, Bradley and Magee 2006, Edwards *et al.* 2007b). A close second to domesticated sheep and goat, indications of sustained cattle management appear in the Middle Euphrates Valley by the 9th millennium BCE (Helmer *et al.* 2005). But while domestication of cattle came about at an early stage, widespread and more substantial cattle husbandry appears only somewhat later, in the 8th and 7th millennia BCE (Arbuckle 2012, 208). The indicine, or zebu, constitutes a separate genetic strand with a separate history of domestication, closely associated with Iranian Baluchistan and the Indian subcontinent (The Bovine

HapMap Consortium 2009). The zebu is characterised by the distinctive fatty hump and dewlap, physiognomic traits that contribute to its greater tolerance to hot, dry environments (Grigson 1996, 42). Remains of *Bos indicus* are common in eastern Iran already from the 5th millennium BCE, and certainly the backbone of animal husbandry in the Indus Valley throughout the latter half of the 3rd and the beginning of the 2nd millennium BCE (Grigson 1996, 44). Given the ample contacts between the Harappan region and the Tigris-Euphrates alluvium, the zebu must therefore have been known, if not outright reared, further west from at least the Early Bronze Age on (e.g. arguments for an early and substantial genetic admixture of taurine and zebu in the Middle East, see Edwards *et al.* 2007a). Osteological analyses generally indicate taurine cattle as the primary bovine species in the Middle Bronze Age dry-farming plains and piedmonts above the alluvium, but occasional indications of zebu in this region should be noted. Grigson has recently discussed the presence of *Bos indicus* at Late Bronze Age Nebi Mend in the northern Biqā Valley (Grigson 2015, 10-11) and observes that bifid vertebras, indicative of *Bos indicus*, have also been found in Middle Bronze Age strata at Tall Brāk, to which we should add bovine figurines with a pronounced hump found at Tall Šāghir Bāzār (Grigson 1996, 50-51, now also McMahon *et al.* 2001, 213). Though the osteological record strongly emphasises a reliance on taurine cattle, the presence of zebu cattle should therefore not be excluded.

8.1.1 Age and qualification of cattle

Cattle are qualified in administrative texts principally with reference to usage, gender, and age (see Stepien 1996, 27 for an exemplary overview). Texts from the alluvium offer references to colour of the skin or specific markings (Waetzoldt 2008, 375, Weszeli 2008), yet such specifications are generally not used in the administrative record, a fact suggestive of uniformity with respects to species and usage (Stepien 1996, 26). A number of cattle breeds native to the Middle East could be related to breeds of the Middle Bronze Age, but the available textual sources do not allow for more specific identification (Dalman 1928-42, VI, 160-162, consider also discussions of cattle breeds identified by Roman authors, cf. White 1970, 278-280, also Kitchell 2014, 36). Gender divisions mainly distinguish between Sum.gu$_4$, Akk. *alpu* for 'ox' or 'bull' and Sum. ab$_2$, Akk. *littu* for 'cow' (see also Stol 1995, 173). With respect to age, cattle are qualified according to year, ranging from suckling calves through first, second, and third-year animals.

Data Type	Detail Data Type	Description
Faunal (Reference)	Cattle (Sum. gu4)	Generic designation.
	Bull (Sum. gu4-ab2)(ASZ)	Breeding bull.
	Cow (Sum. ab2)	Adult female.
	Ox (Sum. gu4-mah)(ALA)	'Mature' or 'great' ox
	Plough ox (Sum. gu4-apin)	Plough ox
	Plough ox (Akk. gu4 *erēši*)	
	Fattened cow (Sum. ab2-še)(ASZ)	Cattle fattened through supplementary grain feeding.
	Fattened ox (Sum. gu4-še)(ALA)	
	Suckling calf (Sum. amar-ga)	Generic for suckling calves
	Suckling calf (male) (Sum. amar-ga nita2)(ALA)	Male cattle qualifications according to age prior to maturity.
	Calf (1st year) (Sum. amar-mu-1)	
	Calf (2nd year) (Sum. amar-mu-2)	
	Calf (3rd year) (Sum. amar-mu-3)(ASZ)	
	Suckling calf (female) (Sum. amar-ga-munus)(ALA)	Female cattle qualifications according to age prior to maturity (3rd year heifers not attested in this dataset).
	Heifer (1st year) (Sum. ab2-mu-1)	
	Heifer (2nd year) (Sum. ab2-mu-2)(TUT)	

Table 8.39: Detail Data Types for cattle

Beyond the third year, no further qualification is apparently needed, and from this stage animals would be referred to by way of functional specialisation (Stepien 1996, 26-27, Weszeli 2008, 388-392, but see Stol 1995, 176-178 for a more in-depth discussion). In ascending order, we find then Sum. amar-ga 'suckling calf' (0-6 months), amar-mu-1 (6-12 months), amar-mu-2 (12-24 months), and amar-mu-3 (24-36 months) for first-, second-, and third-year calves respectively. The detailed cattle inventories from Ašnakkum indicate that also calves could be separated and reared according to gender. We thus find herds of bull calves (Sum. amar-nita$_2$) and heifers (Sum. amar-munus) (see below), a pattern also seen at Alalah (ATaB 42.08

and 42.09). The same terminology is employed already at Early Bronze Age Ebla (c. 2400 BCE, cf. Waetzoldt 2008, 375).

8.1.1.1 Draught oxen

The use and tractive power of draught oxen was discussed in the preceding chapter (7.3.1.3), and the present section focuses more exclusively on the training and maintenance of draught oxen. The importance of proper training and feeding is evident both in the cuneiform record (Stol 1995, 184-185, Waetzoldt 2008, 378), from Roman and Greek sources (e.g. White 1970, 280-283), and from ethnographic observation. While oxen should be fully grown, and thus at the earliest in their third year, before being used for prolonged ploughing or hauling, initial training may be undertaken at an earlier stage. In traditional Greek husbandry practice, first-year calves could join older oxen on the threshing floor and, later, follow the cart or perform light work alongside experienced draught animals prior to reaching maturity (Halstead 2014, 49-50). A comparable practice may explain the substantial number of calves and donkey foals appearing in some plough team rosters of the Third Dynasty of Ur (Heimpel 1995, 97-98). By the third year, bull calves could be harnessed and used for traction (Stol 1995, 177). There is little explicit qualification in our sample as to the specific use of oxen, but their purpose may be inferred from the context in which they appear, e.g. in threshing or as draught animals with no formal division between cart and plough oxen (Stol 1995, 185-186 for specific terminology, also Weszeli 2008, 393). The predominance of the generic Sumerian gu$_4$ inhibits further distinction between cows and oxen (castrated males) used for traction, but it is generally assumed here that the latter is meant (note, however, that cows are used for traction alongside oxen some centuries later on the Middle Khabūr, cf. Röllig 2008, 13). Agricultural work diminishes fertility and milk-production of cows considerably, and while nomenclature clearly distinguishes gender and age throughout the current dataset, these are never applied with reference to draught animals (for similar inferences for ancient Greece, see Isager and Skydsgaard 1992, 89, for an ethnographic perspective, see Johannsen 2011, 14-16). The table below (Table 8.40) offers some illustration of institutional tillage capacity as calculated from numbers of draught oxen attested at individual study sites.

	Oxen	Teams (6-8 oxen)	Tillage (10 ha/pair)	Tillage (30 ha/team)	Reference
Tuttul	60	3	300	90	KTT 287
Šehnā	30	4-5	150	120-150	Ismail 1991, Text 103
Ašnakkum	50	6-8	250	180-240	OBTCB 53, 57, 60
Šušarrā	30	3-5	150	90-150	Sh 2, Text 137
Alalah	28	3-5	150	90-150	ATaB 41.36

Table 8.40: Groups of draught oxen at various study sites with estimated tillage capacity per agricultural season

8.1.2 Cattle feeding practices

Even if the primary source of food for cattle would have been from pasture, supplementary feeding of cereals and legumes appears in the case of draught oxen, but also ordinary cattle. Draught oxen required intensive supplementary feeding during autumn, winter, and spring ploughing. In the summertime, rural communities in Greece often reserved particularly fertile pastures for draught oxen (Halstead 2014, 50). Draught oxen lose weight during the summer months, and so begin autumn ploughing at a point were both body reserves and fodder stocks are low (consider White 1970, 282-283). When called upon for ploughing for a period exceeding six weeks, attrition rates even for well-fed oxen become pronounced (for an African example cf. Fall *et al.* 1997).

	Season	*qa*/day	Reference
Khabūr Basin (18th cent. BCE)	Autumn and Winter	3	OBTCB 30, 53, 57, 60
Khabūr Basin (18th cent. BCE)	Winter and Spring	3-4	Ismail 1991, Text 103
Balīkh Valley (18th cent. BCE)	Unknown	2	KTT 287
Balīkh Valley (18th cent. BCE)	Winter	10	KTT 135, 137
Balīkh Valley (18th cent. BCE)	Summer	10	KTT 166

Table 8.41: Daily barley fodder rates for plough oxen

Within our dataset, fodder records that can be securely linked to plough oxen predominantly fall in late autumn, winter, and early spring (Table 8.41). A purchase of fodder for 30 head of cattle from Šehnā calculates with fodder for a 5-month period, namely from *Nabru* (November-December) to *Niggallu* (April-May) (Ismail 1991, Text 103). An issue of vetch from Alalah (ATaB 41.36) calculates with fodder for a six-month period, as do Late Bronze accounts from the Middle Tigris (Freydank 1994, 26). With supplementary feeding in place throughout the winter and into early spring, we would expect draught oxen to be occupied with the tilling of fallow fields in late winter (Halstead 2014, 50-55, but see critical comments by Postgate 2013, 315-316).

We can establish a modern equivalent for the standard barley fodder rate of 3 *qa*/day seen at Ašnakkum corresponding to 2.34 kg/day, in neat agreement with the 2-3 kg of wheat per day generally observed for 20th century CE lowland Greece (Halstead 2014, 52-53). Similar rates appear in the south in the Middle Bronze Age (Stol 1995). Much higher rates are in evidence in the Middle Euphrates Valley, however, even if accounting for a lower measure (say, 0.8 litre) and draught cattle working also into the hot summer months, as in KTT 166 from Tuttul. Lesser reliance on straw may be a factor here, but we should also note that 10 *qa* is a rate commonly associated with the daily *hire* of an ox in the south, and so may be a product of a different managerial context (Stol 1995, 195). Documentation from areas with a higher level of annual rainfall displays a more extensive reliance on emmer and legumes for animal fodder. At Alalah, cattle were fed emmer and vetch at a ratio of two to six measures of emmer to one measure of vetch (Zeeb 2001). As noted earlier (7.2.2.5), similar use of bitter vetch (*Vicia ervilia*) as a protein supplement for draught oxen was common in the Mediterranean and Jordan until fairly recently (Dalman 1928-42, VI, 164-165, White 1970, 283, Palmer 1998, 137, Halstead 2014, 52). In contrast, vetch is not a common element of cattle fodder practices in the south neither during the Third Dynasty of Ur nor during the Old Babylonian Period (Stol 1995, 196). We find bran (Sum. duh, Akk. *tuhhu*) widely used in the latter area, however, especially for fattening at Umma (e.g. Stepien 1996, 33-36). Some distinction in fodder rates for draught oxen hauling carts or wagons should be noted (Table 8.42). A group of oxen hauling carts (Sum. giš-mar-gid$_2$-da) at Tuttul receives 5 *qa*/day, while the yoke of six pulling Yasmah-Addu's litter (Akk. *mayyaltu*) receives 6 2/3 *qa* of groats (Sum. nig$_2$-ar-ra) per day whilst staying at Ašnakkum.

	Season	*qa*/day	Reference
Cart oxen	Spring	5	KTT 131, 152, 161
Cart oxen	Spring	6 2/3	OBTCB 65, 74

Table 8.42: Daily barley fodder rates for cart oxen

Ordinary cattle received supplementary fodder only on rare occasions (I discuss fattening in more detail later, see 8.7). In economic terms, feeding ordinary livestock can be seen both as a controlled measure to increase meat production, but also as an alternative means of storing surplus cereals (Halstead 2014, 292-294). Occasional pieces of documentation demonstrate a relative excess of stored cereals, or at least a willingness to maintain a healthy herd, e.g. in the potentially harsh winter months (Table 8.43). In OBTCB 23, we find an issue of a month's worth of grain fodder for eight breeding bulls and more than 200 calves dated to mid-winter. Similar calculations may underpin the allotment of fodder for cows and young calves in KTT 153, dating to early spring where forage would have been at a low point (see Dalman 1928-42, VI, 165 for similar examples from Palestine). In contrast to the high rates attested here even for young animals, the two *qa* of barley per head given to a herd of, we assume, mature cattle, passing Ašnakkum in high summer is significantly lower (cf. OBTCB 45).

	Season	*qa*/day	Reference
Bull (Sum. gu4-ab2)	Winter	10	OBTCB 23
Calf (3rd year)	Winter	4	OBTCB 23
Calf (2nd year)	Winter	3	OBTCB 23
Calf (1st year)	Winter	2	OBTCB 23
Cow	Spring	15	KTT 153
Calf (1st year)	Spring	4	KTT 153
Cattle	Summer	2	OBTCB 45

Table 8.43: Daily barley fodder rates for ordinary cattle

8.1.3 Cattle herds

Within the dataset, cattle holdings generally fall in two distinct groups; draught animals and breeding herds. The former occurs regularly in fodder disbursements or plough team rosters, while documentation on the latter is generally rare. A few examples from the dataset are discussed here with regards to herd composition and size. The composition of herds seen at Ašnakkum gives one or two bulls to an average 40 cows, with smaller numbers of calves (see below). Proportions given by Weszeli for the contemporary alluvial plain give 1 bull to 30-50 cows (Weszeli 2008, 392). Similar ratios are found in e.g. Roman sources (Kitchell 2014, 36) and across much of Africa (Dahl and Hjort 1976, 29 with further references). The overall ratio between males and females emerging from OBTCB 68 (see below) lies within a range of some 60-70% females. There is little in the way of an ideal size for a flock entrusted to one herder in the ethnographic literature, but natural constraints related to e.g. water needs and movement suggest that a cattle herd should number no more than 150 head (Dahl and Hjort 1976, 254 with further references, consider also Dalman 1928-42, VI, 246, also White 1970, 287). In the Middle Bronze Age alluvial plain, we find reference to cattle herds roughly in the range of 30-40 and up to 80-90 head (Stol 1995, 180-183), with the higher figures echoed at Ašnakkum e.g. at 80-90 head per herder (see below). If the chief herder cited in a letter below concerning 1,200 head of cattle in the plains north of Tuttul was satisfied with a workforce of some twenty herders, then we are looking at an average 50-60 head of cattle per herder (see below and cf. ARM 1, Text 118).

Extensive cattle herds could serve both as a source of milk, hides, and meat, but their ability to reproduce seems the most important aspect to institutional household economies where draught power was in constant demand (Zeder 1991, 28-30). Modelling based on traditional herding systems in Africa suggests a low calving rate at c. 50% of the mature female population for *Bos indicus* (Dahl and Hjort 1976, 35-36). Gelb, in a study of a Third Dynasty of Ur account of the growth of a cattle herd over a ten-year period, consistently obtains the same figure (37-50% with an average of 46.3%, cf. Gelb 1967, 66-67 and Fig. 61). If we assume the relationship between suckling calves (Sum. amar-ga) and mature cows (Sum. ab_2) to represent an approximate *minimum* calving rate, then herds at Ašnakkum demonstrate a very similar ratio (44% and 52%, cf. OBTCB 68 discussed below). Slightly lower or corresponding rates appear in Neo-Babylonian cattle inventories (cf. van Driel 1995, App. 2-4), but a comparable text presented by Stol from the Middle Bronze Age alluvium is much less conclusive (Stol 1995, 180-183 and YOS 113, Text 350). Modelling results cited above suggests an annual net growth of a cattle herd of 3.5%, when accounting for mortality due to illness or predators (Dahl and Hjort 1976, 231 and Table 210.234).

Institutional cattle holdings were extensive, though the documentation is sometimes haphazard or difficult to assess. We can begin with a dossier of four inspection records from Ašnakkum (ASZ Dossier 4), in particular OBTCB 68, which offers one rare and relatively comprehensive overview. While partly damaged, a reconstruction of the available numbers suggests six herds counting at least 310 head in total, of which the first four are breeding herds with an aggregate total of some 175 cows and 7-10 breeding bulls and a smaller group of calves (Figure 8.43). The first four groups are breeding herds, while the last two consist solely of young heifers grazed separately. The remaining three texts in this dossier account for head entrusted to the fatteners (OBTCB 69), head dispatched to other locations or head given as gifts (OBTCB 76), and head lost or given in exchange (Akk. *pühtu*) for others. When juxtaposed (Figure 8.44), the four inventories make up for a minimum of close to 400 head at hand when the inventories were drawn up. Assuming Sum. gu_4 to mean 'oxen' in OBTCB 76, it should be noted that the majority of cattle distributed to individuals and locales (the exact nature of these transactions is unclear, but it seems safe to assume that it was not temporary) were male oxen, and thus demonstrates a selling off or displacement of young males.

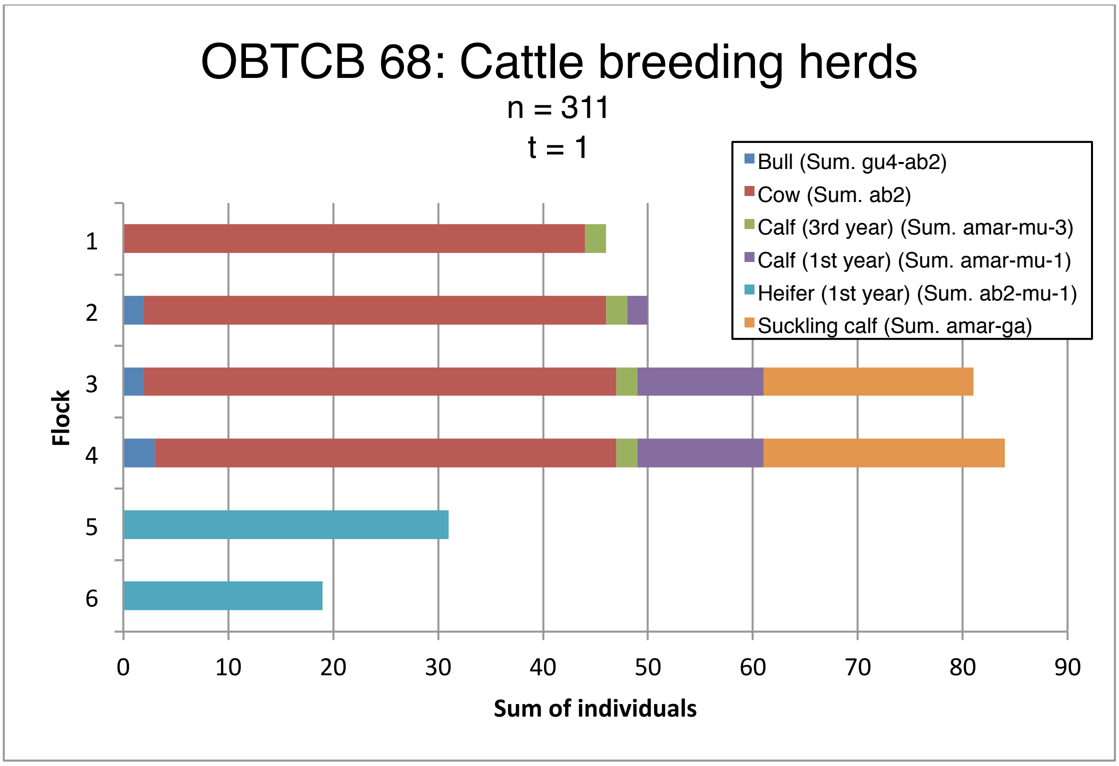


Figure 8.43: Reconstructed numbers for Ašnakkum breeding herds

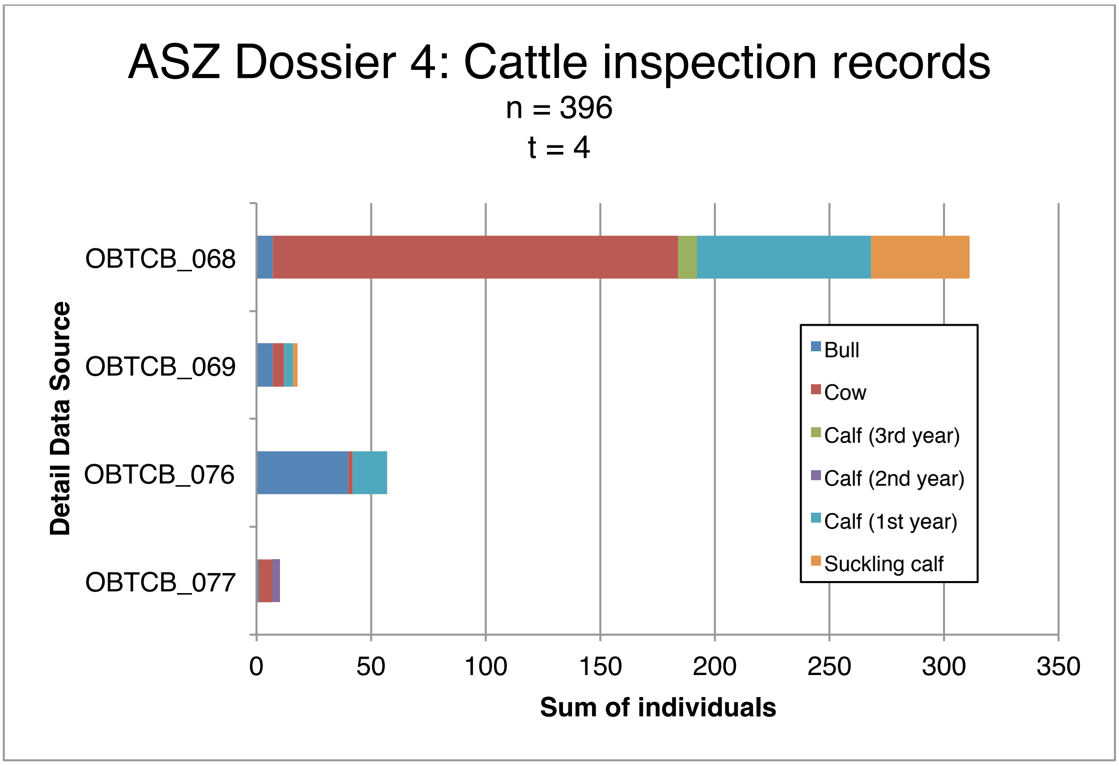


Figure 8.44: Cattle accounted for in Ašnakkum inspection records

Numbers of a similar magnitude are found at Šušarrā. Sh 2, Text 137 is an inventory summarised as 'cattle of Kuwari' (Table 8.44). Of a total 138 head of cattle, one fifth is assigned to ploughing, with two slightly smaller groups assigned to hauling carts (Akk. *mayyaltu*) or fattening (Akk. *namrātu*). Close to half of the total are entrusted to named individuals or local villages in small numbers, while a carpenter (Sum. nagar) is overseeing 19 animals. While offering no detail as to age and gender composition, distribution and work assignments would suggest a breeding herd to have been accounted for elsewhere.

	Ploughing	Carts	Other	Fattening
Cattle	30	25	62	21

Table 8.44: Sh 2, Text 137: Cattle at Šušarrā

Courtesy of its strategic location, the city of Tuttul acted as a logistical hub also for transhumant flocks of cattle, sheep and goat during the Bronze Age (e.g. sheep of Yasmah-Addu being taken from Tuttul to Šubat-Šamaš, cf. A.3937 r.11-13). During the reign of Šamšī-Adad, the presence of substantial cattle herds in the upper reaches of the Balīkh Valley is relatively well documented in contemporary epistolary sources from Mari. Here most eloquently in an excerpt from Mari where

Yasmah-Addu conveys the malpractice of an official at Šubat-Šamaš to his father, the great king:

> "Hardanum, the herder (Sum. sipa) told me this concerning the cows in the care of Ikšud-appašu: "The good cows of the palace are being neglected. For 1,200 cows, I have (only) three drivers (Akk. *kaparru*) with me. (…) Because there were no herders (Sum. sipa) five cows have broken loose from the enclosure and escaped into the land and five cows were consumed by a lion in a thicket. Earlier, Sîn-tiri gave me 20 herders, inhabitants of the country, and they stayed with us. Now, Ikšud-appašu has deprived us of them." This he said to me, and I said as follows to Ikšud-appašu: "There are no herders and the cows of the palace are neglected! Whose fault is this? Are these cows not always pastured in your district?" (ARM 1, Text 118)

The Sîn-tiri who called up local herders to assist Hardanum is a well-known and very high-ranking steward in the realm of Šamšī-Adad often acting as an executive authority in the western part of the kingdom, especially in the Balīkh and in the Harran Plain (Villard 2001, 83-85). An unpublished letter attributed to him concerns the movement of undernourished cattle from Tuttul north into the Balīkh Valley (TH.72.1, cf. Birot 1973, 2-3). The historical relation of these two letters can be debated (Heimpel 2003b, 319-322), but the essential point, namely that the Balīkh and the plains further north, constituted important cattle pastures, seems evident enough. The magnitude of institutional cattle herds grazed in the region, *in casu* the 1,200 head of Hardanum, comes into sharp relief when turning to the dossier of cattle tags from Tuttul. Supplying us with information on cattle lost, either to natural causes or to predators, most preserved entries relate to cows (Sum. ab_2), with a few attestations of one- and two-year old calves and heifers (Figure 8.45). If these figures derive from a situation of relative normality, a fatality rate of *at least* 48 head in a single year would suggest an aggregate herd size some ten to twenty times larger, suggesting that Hardanum was not wholly succumbing to rhetorical hyperbole when he counted a herd of 1,200 in ARM 1, Text 118. If using general mortality rates of 5-15% observed for African herds in general (Dahl and Hjort 1976, 37-40), the total number of dead animals from REL 189 (48 head) and 190 (14 head) suggest, respectively, a living herd size of at least 320-960 and 93-280 head.

Compared to accounts from the Jazīrah, it is less easy to tease out an exact count of the numbers of cattle receiving fodder in the Alalah grain disbursement records. The main reason for this is the prevailing local scribal habit of accounting only for bulk amounts of fodder to a group of animals, rather than the exact number of animals being fed.

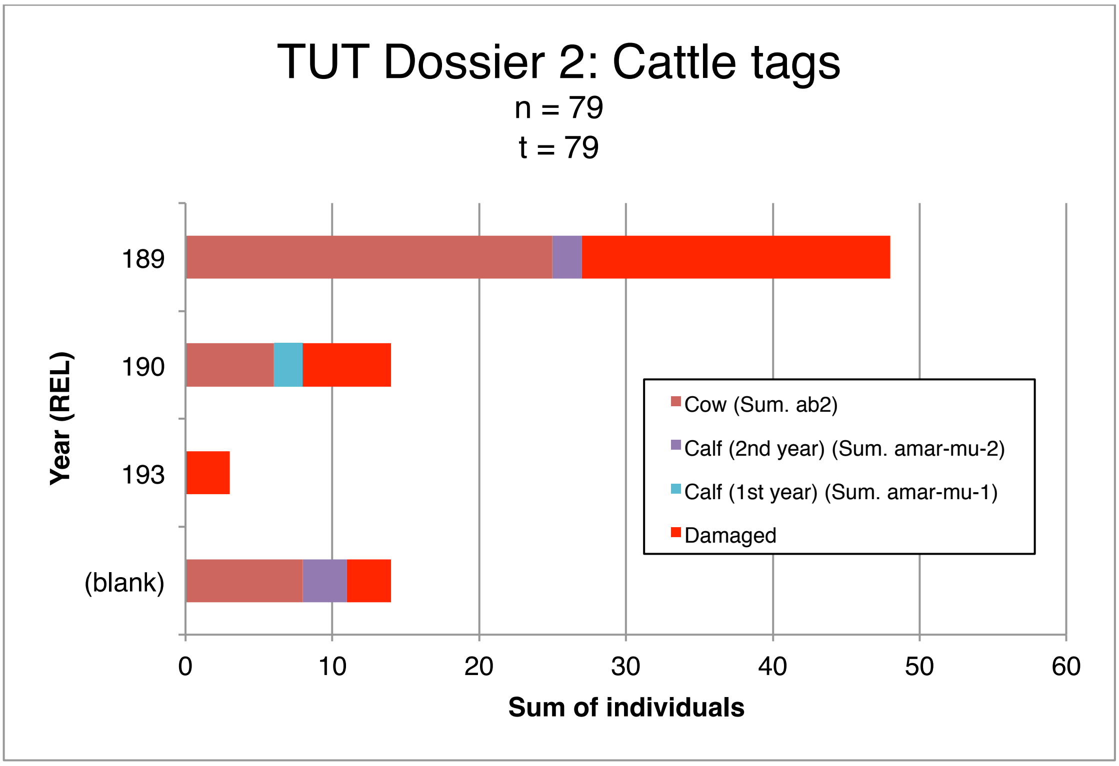


Figure 8.45: Distribution of dead cattle listed in the Tuttul cattle tags by year and type

In light of fodder rates discussed earlier, we can make some approximate estimates from monthly fodder issues. A key text to consider here is ATaB 41.36, a disbursement of vetch (Akk. *kiššanu*) accounting for several distinct groups of cattle. Two entries mention groups of plough oxen (Sum. gu_4-apin-la_2) and fattened oxen (Sum. gu_4-še), the former receiving 28 *qa* per day for a period of six months, the latter 20 *qa* for a period of four months. These two groups are likely linked to the agricultural manager (Sum. engar) and the household steward (Sum. lu_2 e_2-uš) respectively (see discussion and analysis by Zeeb 2001, 287-313). Assuming that both groups of cattle received vetch as a supplement to a cereal-based diet, we would expect a daily rate to be approximately one *qa* per head, landing us at 28 plough oxen and 20 head of cattle kept for fattening. Both figures agree with similar entries from, especially, Šušarrā, but also Ašnakkum and Tuttul.

8.2 Sheep and goat

Sheep (*Ovis aries*) and goat (*Capra hircus*) are ubiquitous elements of Middle Eastern rural economies, reared for the procurement of meat and milk and, most importantly, their fleece (wool and hair) for the manufacture of textiles (van de Mieroop 1997, 144). They are among the earliest species of animals domesticated by humans. The domestic sheep descends from several wild populations, yet appears particularly closely related to the Asiatic mouflon (*Ovis orientalis*)

(Hiendleder *et al.* 2002, Bruford and Townsend 2006). Sheep are first attested in a managed context in Neolithic communities of c. 10,000 BCE (Zeder 2008, Stiner *et al.* 2014), with indications of more extensive sheep husbandry in the Jazīrah and adjoining regions appearing in subsequent millennia (Arbuckle 2012, 203-204). The goat, likewise, descends from wild breeds native to the region, namely the bezoar (*Capra aegragus*) (Naderi *et al.* 2008), and follows a history of domestication much related to that of sheep. By the beginning of the Bronze Age, both were principal and extensively herded elements of husbandry practices across the region. Sheep and goat appear only haphazardly in texts considered here (Table 8.45), probably a reflection of their use mainly as a source for wool, and the related practice of feeding them by pasturing through much of the year. Sheep generally do not appear in grain disbursement records, which is otherwise the chief source on livestock in the textual assemblage considered here. A relatively high amount of attestations concern male animals and lambs taken out for offerings (see below).

Data Type	Detail Data Type	Description
Faunal (Reference)	Sheep (Sum. udu)	Generic.
	Ewe (Sum. u8)	Adult female.
	Ram (Sum. udu-nita2)	Adult male. The relation between udu-nita2 and Akk. *ālu* is not certain.
	Ram (Akk. *ālu*)	
	Lamb (Sum. sila4)	Lamb. Distinction between weaned and suckling lambs is rarely clear in the dataset.
	Spring lamb (Sum. sila4-nim)	
	Suckling lamb (Sum. sila4-ga)(SZU)	
	Fat-tailed ram (Sum. gukkal-nita2)(SZE)	Adult fat-tailed male sheep.
	Ram (Sum. gakkul-nita2)(ASZ)	Adult male sheep of unclear breed (from Sum. gakkul, 'vat')
	Sheep (Akk. udu *kurû*)(TUT)	Likely young sheep (from Akk. *kurû*, 'short')
	Ram (Akk. *atūdu*)(TUT)	Wild male sheep.
	Ram (Akk. *daššu*)(TUT)	Male goat.

Table 8.45: Detail Data Types for sheep and goat

8.2.1 Types of sheep and goat

The generic term for sheep in cuneiform sources is Sumerian udu, with the Akkadian cognate *immeru*. In the plural, both may designate groups comprising male and female animals, and also include goats (see for example OBTR 202). Male gender distinction (full-grown rams) is given as Sum. udu-nita$_2$, Akk. (see Postgate 2009a, 116 for a detailed overview). Lambs (Sum. sila$_4$, Akk. *puhādu*) figure in a variety of notations, especially qualified as ‘spring lamb’ (Sum. sila$_4$-nim, Akk. *hurāpu*). A distinction between wild and domesticated sheep does not emerge from the texts considered here, but accounts from the alluvium occasionally distinguish between wild mouflon (*Ovis orientalis*, Sum. udu-hur-sag) and domestic sheep (*Ovis aries*, Sum. udu), and both species were exploited and occasionally cross-bred (Steinkeller 1995, 50, with important comments by Ryder 1993, 13). The Sumerian qualifier for mouflon is semantically related to ‘mountain’, and while no clear evidence for the rearing of wild sheep appears in Middle Bronze Age sources from the dry-farming plain, their presence should not be excluded. In contrast to cattle, there are multiple varieties of sheep breeds across the various assemblages contained in the dataset. Administrative records from the Third Dynasty of Ur offer an even wider array of breeds. Steinkeller identifies eight distinct breeds of sheep, with an emphasis on native (Sum. ki-en-gi) sheep, varieties of the fat-tailed sheep (Sum. gukkal), and long-fleeced sheep (Sum. a-lum), as well as three regionally specific sheep that can be associated with the western Iranian Plateau and the Zagros uplands (Steinkeller 1995, 51-54 and 59). Though terminology varies, a broadly similar range of breeds appear at Umma (for an overview and discussion of terminology, see Stepien 1996, 16-24). Less elaborate administrative systems may employ simpler terminology and the level of distinction with regards to breed should generally be considered in relation to the scope and aims of accounting practices (e.g. in Old Babylonian Ur, cf. van de Mieroop 1993, 162).

Breeds contained in the present dataset count three main types. A common type is the Amurru-sheep (Sum. udu mar-tu), especially well attested at Šehnā. In a letter regarding estate holdings of Kuwari, located further east in the Zagros Mountains reference is made to Šubarean sheep, potentially referring to a Jazīrah or Tigridian breed (Eidem and Læssøe 2001, 120). Fat-tailed sheep (Sum. gukkal) are rather rare in the present dataset, but may be reappearing in larger numbers in the Late Bronze Age as *zibbutu* (Postgate 2009b, 117). In comparison, modern sheep populations across the region are comprised overwhelmingly by the fat-tailed variety, (Arabic *'awāssī*), especially in Jordan, Syria, and the Iraqi Jazīrah (e.g. Dalman 1928-42, VI, 180), while a black-headed breed (Arabic *'arabi* or *šafālī*) is common in the alluvium and the lower Euphrates valley. A handful of other breeds are typical to the Zagros flanks to the north and east (Ryder 1983, 234-236).

8.2.2 Sheep and goat herds

Sheep can be herded in much larger numbers than cattle, but care should be taken in distinguishing between aggregate numbers of sheep owned and the number of sheep actually herded by a single shepherd. Ryder suggests a ceiling of 300 head to one herder (Ryder 1993, 14), agreeing with figures in the range of 200-250 head from Africa (Dahl and Hjort 1976, 255-256). For pastoralists in the central Zagros, Barth observes that up to 300-400 sheep can be herded by one person (Barth 1961, 6-7). As is common practice in the Middle East also today, sheep are generally herded together with a comparatively smaller contingent of goats in order to diversify and thereby increase forage consumption and to improve flock and grazing behaviour (e.g. Dahl and Hjort 1976, 249-251). The number of goats to a sheep herd varies, with less than 10% in texts from Middle Bronze Age Ur (van de Mieroop 1993, Table 1) but around a third at Late Bronze Age Nuzi (Morrison 1981, 274). Adult sex ratio within flocks varies significantly in the cuneiform documentation and in ethnographic literature more generally, predominantly as a consequence of environmental and nutritional factors (see e.g. Dahl and Hjort 1976, 88-89). Ryder gives a breeding average of 1:35 for modern Iraq (Ryder 1983, 236), while Morrison's study from Late Bronze Age Nuzi suggests slightly lower figures, at 1:25 (cf. Morrison 1981, 273-275, discussed by Ryder 1993, 17-18). Much more even figures – c. 1:3 - appear in Middle Bronze Age herding contracts from the alluvium (Postgate 1975, 19), but the lack of distinction between wethers (castrated males) and rams should be noted here (cf. discussion by Morrison 1981, 272-275, also Kraus 1966, 26-27). A similar problem may underlie ratios of 1:3 or 1:2 in Middle Assyrian herd inventories (Ismail and Postgate 2008, 151-152 and Table 152). Adult sex ratios within sheep flocks attested in Bronze Age textual documentation generally point to mixed-purpose herding with an emphasis on wool production complemented by limited culling of kids and males for meat (see comments by Ryder 1993, 18, for a recent study on kill-off patterns, see e.g. Helmer *et al.* 2007).

Wild progenitors and most subspecies of the domesticated sheep are seasonal breeders, meaning that they are physically disposed towards mating at certain times of the year. Short day breeders, such as sheep and goat, generally mate in the autumn, before the coming of winter. The breeding season of wild sheep (*Ovis orientalis*) falls in November and December followed by a gestation period of around five months. This cycle produces offspring in early spring. Various strands of the domestic sheep diverge from this pattern, but rutting is still generally confined to the period from September to December (Ryder 1983, 11-13). There is some debate as to the timing of lambing in cuneiform sources, mainly because the timing for rutting and lambing is mostly inferred from the time elapsed before the fleece of the lamb can be shorn for the first time. Postgate and Payne suggest lambing in October-December based on a study of herding contracts from the Middle Bronze Age alluvial plain (Postgate 1975, 12-15 and 19). Morrison, in her study of husbandry at Late Bronze Age Nuzi, asserts that breeding would have occurred throughout the year (Morrison 1981, 276). While some Asian varieties of sheep may breed throughout the year, the majority of lambs arrive in spring and autumn, and a significant alteration of the rutting and lambing season would thus be a result of human manipulation (Ryder 1983, 12, 1993, 18-19).

Benchmark breeding figures are available from the alluvium. Kraus gives the scribe's projected 80% annually of the total number of adult females for Old Babylonian Larsa (Kraus 1966, 24-26), while Payne arrives at 69% for contemporary texts from the northern alluvial plain (Postgate 1975, 19-20). At Late Bronze Age Nuzi, a minimum lambing rate of 78% can be deduced (Morrison 1981). These are all low values compared to modern averages, but convincing in their overall agreement (see comments by Ryder 1993, 19). It is not clear if these numbers account for the higher mortality rate that should be expected for suckling lambs. While van de Mieroop is sceptical of projected averages of losses in excess of 10% of the herd per year, sheep inventories from Middle Bronze Age Ur indicate loss rates within a range of 1-10% (van de Mieroop 1993, 165-166 with further references). Contracts from Larsa occasionally allow for a projected loss of some 10-15% of a herd (Kraus 1966, 56). Data gathered by Dahl and Hjort suggest a high, but quite variable mortality rate for lambs, generally within 15%-50%, though higher percentages are not unheard of (Dahl and Hjort 1976, 95).

Data on sheep flocks available from our assemblage is rather patchy, but demonstrates some general consistency in terms of accounting practices. Broadly speaking, sheep are accounted for either individually or in very small numbers when appearing as ceremonial gifts or in a sacrificial context. Vincente 1991, Text 70, a tabular record of gifts received for the mid-winter *elunnu*-festival at Šehnā, provides an example of what such customs could amount to on rare occasions. Among a variety of metal artefacts and textiles we find also bulls, cows, and a total of 95 sheep and 60 goats received from some thirty different entities (when counting the number of entries. The break on the right side of the tablet has done away with information on their origin). More common is the giving of one or two sheep, especially rams, by city elders and neighbouring lords, thus for example receipts such as Ismail 1991, Text 129, 130, and 131. A few texts from Qaṭṭarā are of the same order, thus seven rams in OBTR 201 and more than 15 rams, lambs, and goats in OBTR 203 all delivered by named individuals. Higher numbers, as the 21 rams forming part of a potential audience gift in Ismail 1991, Text 106, are generally rare. The high frequency of male animals in such texts suggests animals given for slaughter. In extension, sheep also form a common element in offerings (Sum. siškur, Akk. *nīqu*), for example in OBTR 199, an account of 70 sheep (Sum. udu) sacrificed by Iltani on the 30th day of Nigallu, i.e. by harvest time. This number alone would suggest sheep herds to number in the high hundreds. Nanny goats and lambs are recorded for the same purposes, specifically for four different deities, some months later (OBTR 200). In all, such accounts appear in relatively sparse numbers, and generally concern a limited number of animals, say, usually less than five. The general paucity of references to the systematic culling of sheep or goat for meat in the present dataset is reflected more generally in Bronze Age sources from elsewhere (e.g. for the Middle Bronze Age alluvium, cf. van de Mieroop 1993, for Late Bronze Ugarit, cf. Sanmartín 1993). This is not to say that institutional household economies or the general population did not consume sheep and goat, merely that utilisation of sheep and goat populations catered for a variety of needs, and here principally wool production (for a Middle Assyrian example, see Ismail and Postgate 2008, 152, Postgate 2013, 294-298).

While the format of texts relating to sheep offers very little information on the social context of their use, basic appreciation of the numbers involved can help interpretation. For example, an account of a flock of sheep and goat received from the lord of Amaz and entrusted to the institutional livestock manager at Šehnā is suggested by Vincente to constitute a customary gift (Vincente 1991, 422-426). Yet the size and composition of the herd, numbering a total 127 head with a relatively even ratio of male and female animals and 10% goats suggests an average herd entrusted (Akk. *paqādu*) to the manager for grazing, perhaps on stubble fields (note that the text is dated to early summer, and see e.g. Postgate 2013, 297 for considerations on herding contracts and livestock inventories). Herding contracts or inventories drawn up at the time where shepherds would take the flocks to more distant pastures are more readily recognised at Qaṭṭarā. In OBTR 202, we find an account of a total 31 sheep and one goat gathered from a variety of individuals and entrusted to a shepherd (Akk. *ša ana qāt* lu2-sipa *paqdu*) in late winter, in agreement with the general timing for shearing and grazing (Postgate 1975, 4). Similarly terse accounts are likely to indicate corresponding practices at Šušarrā, e.g. Sh 2, Text 126, which lists a total of 131 sheep and goat divided into two herds and entrusted to named individuals, again likely shepherds. ATaB 42.10, from Alalah, exhibits a similar composition. Attestations of larger flocks are rare and offer little contextual information, e.g. a treacherously short note concerning 28,700 sheep sent to Alalah by the lord of Karkamiš in ATaB 43.06. Assuming such numbers to constitute occasional gifts or transfers of tribute between polities (as seen in the latter case, cf. Wiseman 1953, 15) fails to account for the overall scale of institutional sheep husbandry and the relatively common practice of moving flocks over sometimes long distances to pasture. A letter to the lord of Šehnā draws up the arrangements for grazing some 4,000 sheep belonging to one of his neighbours in the lands around the city (RATL 10, with comments on the historical geography by Eidem 2011a, 36). While reliable numbers are hard to come by, similar ways of interweaving economic reality with political networking are in evidence from across the Jazīrah (see 8.10).

8.2.3 Shearing and wool

Wool does appear in the present dataset, although in instances too haphazard to provide substantial insights. A few general comments are merited, however. Throughout much of the Early and Middle Bronze Age Middle East, sheep were plucked (Akk. *baqāmu*), not sheared (Akk. *gazāzu*), a practice quite common with primitive, and therefore moulting, sheep breeds, although it would most surely be a cruelty to their modern relatives. Wild sheep and primitive domestic breeds cast a substantial amount of their fleece undercoat in spring, while maintaining a hairy outer coat, or kemp (Ryder 1983, 45-49). Under domestication, the undercoat has been developed to enhance wool production. Being more closely related to their wild progenitor, early breeds of domesticated sheep likely maintained the ability to moult for a considerable span of time, a suggestion underscored by the low fleece yield generally observed in the cuneiform record for Bronze Age sheep (Ryder 1983, 95-96), and the semantic distinction between the actions of plucking and shearing. Local variation prior to the Iron Age seems primarily an issue of distinguishing between sheep and goat, hence at Late Bronze Age Nuzi where sheep is reckoned to be plucked and goat shorn or cut (Morrison 1981, 267). A similar distinction is implied in a legal document from 17th cent. BCE Alalah, where part of the purchase price is given as '10 minas of plucked (Akk. *baqmātu*) wool, 20 minas of cut (Akk. *gazzūtu*) wool' (ATaB 22.05). At Šušarrā, a debated passage in a letter (Sh 1, Text 59) mentioning 'copper cutters' (Sum. urudu ku_5-kin) may indicate a cutting of goat (goat kids appear in v. 20, though the missive also relates matters on the coming harvest, cf. Eidem and Læssøe 2001, 129-130).

	Wool kg/sheep	Reference
Palestine (19th-20th century CE)	2	Dalman 1928-42, VI, 180
Crete (14th cent. BCE)	0.75	Killen 1993, 210
Nuzi (15th cent. BCE)	1	Zaccagnini 1981, 355
Southern Iraq (19th cent. BCE)	0.83	van de Mieroop 1993, 172
Pre-Sargonic (24th cent. BCE)	0.68	Powell in Ryder 1993, 15

Table 8.46: Average weight of fleece per sheep

The time for plucking or shearing coincides with migration from winter to summer pastures, and falls just before the beginning of the harvest of winter crops. Hence, it forms a prelude to the most labour-intensive part of the agricultural year, as shown in remarkable detail in a letter from Šušarrā concerning an estate in the Zagros mountains (Eidem and Læssøe 2001, 129-130):

> "You know that (the time for) grazing (Akk. *šammu*) is nearing in Zigula, and the copper cutters (Sum. urudu ku_5-kin) that you entrusted to Hizzuta – have a thousand delivered for the kids (Sum. $sila_4$)! They are needed for the goat kids (Sum. $sila_4$ uz_3). Have them delivered! And send the servants that you promised. You know that the harvest (Akk. *ebūru*) is nearing." (Sh 1, Text 59 v. 15-20, r. 1-4)

8.3 Dairy products

Dairy products are not attested in the present dataset, but should also be briefly considered here. All mammals produce milk in some form, yet the principal milk producing strands of livestock have, throughout agricultural history, been cattle, sheep, and goat (and later also camels) (Vernon 1999, 694). Milk does not appear in our sources, and documentation within the cuneiform corpus more generally remains sparse. Most extensive references to types of dairy products come from lexical lists and literature. Administrative documents from the Third Dynasty of Ur do offer some additional detail at the everyday level (Stol 1993a, Stol 1993b). Given the difficulties related to preserving fresh milk for any reasonable amount of time (Vernon 1999, 692), this is not surprising, and may be explained by considering milk an integral by-product of kept livestock (Goddeeris 2002, 364). Cows and goats kept near or in the palatial structure likely supplied the household with dairy products, while we should count on herders receiving the milk from the herd as part of their income, naturally then entirely avoiding the scope of administrative documentation (Postgate 2009b, 119). Accounting for deliveries of ghee (Sum. i_3-nun) in two Middle Assyrian summary accounts on herding at Dūr-Katlimmu offers a good example of these aspects of animal husbandry (BATSH 9, 44 and 51, cf. Röllig 2008, 15).

8.4 Pig

Turning to livestock suited for intensive meat production, we will discuss in the following sections pig, fowl, and fish. The common pig (*Sus scrofa domesticus*) is a domesticated relative of the wild pig (*Sus scrofa*) (Groves 2007, Ruvinsky *et al.* 2011). Evidence of domesticated pig in the Mediterranean Basin and Southwest Asia dates as far back as the late Neolithic, ca. 8,000-6,000 BCE and centres primarily on the Anatolian plateau (Larson *et al.* 2007, 30-31, Larson *et al.* 2011, 20-21). Various aspects of physiological change observable in the zooarchaeological record suggest that pig domestication constituted a prolonged, gradual transition, constantly intermixing wild and domesticated populations (Larson and Burger 2013, 198-199). The discovery of suid remains on Cyprus dating to the 9th millennium BCE, for example, appears indicative of an intermediate stage of wild pig-human interaction (Vigne *et al.* 2009). Wild specimens appear regularly in the archaeological record, and travellers' accounts on the fauna of especially the Middle Euphrates valley indicate that wild pig remained common until very recently (Grigson 2007, 84, see e.g. Blunt 1968 [1879]). Wild boars were hunted until well into the Iron Age (Dalix and Vila 2007), and make up a larger proportion of suid remains in some periods (Grigson 2015, 12). The archaeological distribution of domesticated pig remains from across the Bronze Age spans almost the entire Tigris-Euphrates drainage and most of the Bilād al-Šām, from the Taurus flanks to the Persian Gulf and pig often constitutes one of the single-most attested species in faunal assemblages after cattle and ovicaprids (Parayre 2000, 146-153, Albarella *et al.* 2006, 220, Vila 2006, Grigson 2007, 89-96). By all standards, the pig ranked among the principal sources of meat in the Bronze Age Ancient Near East, not surprising considering that pigs are omnivores, have a faster growth rate than other species of livestock, and provide meat rich in nutrients and fat (Zeder 1991, 38-40). Indications of a gradual decline in pig husbandry towards the Middle Assyrian period has been linked to an emerging taboo against pork consumption (Radner 1997, 293), yet zooarchaeological remains from a number of Late Bronze and Early Iron Age sites across the Jazīrah may betray a more complex picture (Parayre 2000, 152-153).

The distinction in cuneiform terminology between wild boar and domesticated pig is not always clear. We find reference e.g. to 'reed-forest pig' (Sum. šah giš-gi), likely wild or semi-domesticated specimens of *Sus scrofa* (Weszeli 2009, 319, Veldhuis 2006, 26). Common in riparian environments, these appear for example along the Euphrates and in the Balīkh (Jakob 2003, 354, but see also Wiggermann 2000, 199), and also in the marshes of the lower Tigris-Euphrates drainage where they can grow to exceptional size (Harrison 1968, 372-376). At Late Bronze Age Nuzi near Kirkuk, a group of presumably wild pig are brought from the mountains (Lion 2006, 104). Distinct cognates for boar (Sum. šah-nita$_2$) and sow (Sum. munus-šah) are known in cuneiform, but do not appear in the present dataset (see for a general overview of terminology e.g. Cavigneaux 2006). With respect to age, we find piglets (Sum. šah-tur), though not qualified to any further degree. We are left to guess as to the size of pigs reared in the Bronze Age. Traditional breeds in Greece generally supply a carcass weight of no more 35-70 kg and up to 70-100 kg when intensively fattened (Halstead and Isaakidou 2011, 167), in relative agreement with the average 75-100 kg live weight of full-grown traditional breeds from Sardinia (Albarella *et al.* 2011, 154).

8.4.1 Herding and feeding pig

Pigs can be reared as free-range livestock, primarily on forest or open woodland pasturage where the coming of the autumn and spring offered a wide variety of nuts, fruits, tubers, and small insects, or intensively as penned household animals in and around human settlements, feeding on garbage and excreta or on cereal fodder or byproducts (Gade 1999, 537-539, for traditional examples, see e.g. for the Iberian peninsula López-Bote 1998, for Greece Halstead and Isaakidou 2011, for Sardinia Albarella *et al.* 2011). As the former feeding regime is seasonally specific, these two sets of practices are not mutually exclusive, yet they tend to enhance differing physiological traits, free-range pigs being smaller and more agile, while sty or household pigs are generally larger and less mobile (Clutton-Brock 1999, 95). Pigs are, as a rule, not easily driven over longer distances, and their presence in human communities tend to indicate a permanent state of settlement (Grigson 2007, 99-100, also Zeder 1996, 298, but see for examples of transhumance in extensive pig husbandry e.g. Albarella *et al.* 2011, 155-156 and Table 115.151, also Halstead and Isaakidou 2011, 163-164). They require less attention than other species of livestock, are relatively easy to control, and can as such be left to roam free, in sties or around settlements (Clutton-Brock 1999, 95-97, Kitchell 2014, 151).

Pigs are notoriously vulnerable to high temperatures and will die quickly when exposed to sunlight and temperatures in excess of 35˚. Provided with vegetation canopies for shade and with access to substantial amounts of water, they may withstand temperatures of 30˚ or slightly above (Grigson 2007, 98-99, note also Greek practices of foraging by night during high summer, cf. Halstead and Isaakidou 2011, 164). This naturally places some constraints on pig husbandry, and especially so when talking of the Middle East, where the summers are most often extremely hot and very dry. While extensive evidence for domesticated pig in the 3rd millennium BCE southern alluvium illustrates viable conditions within riparian micro-environments (Grigson 2007, 106-107), sites close to the limits of dry-farming in the Jazīrah would have offered less secure habitats for pig husbandry.

	Drove size	**Reference**
Sardinia (19th-20th cent. CE)	100-300	Albarella *et al.* 2011, Table 15.11
Roman Italy (2nd-1st cent. BCE)	100-200	White 1970, 316
Syrian Jazīrah (18th cent. BCE)	150-200	OBTCB 34, 54, 56
Southern Iraq (21st cent. BCE)	100-550	Dahl 2006, 36
Southern Iraq (24th cent. BCE)	150-200	Lambert 1961, 39

Table 8.47: Size of pig droves

Given the relatively long history of pork taboo in the Middle East, it is hard to draw any firm conclusions on drove size and composition in Bronze Age contexts based on local ethnographic comparisons (Table 8.47). Recent examples from Sardinia imply a drove size of 30-50 head to be a common average for larger herds, but several informants give much higher figures, e.g. 100-300 head, for professional herders in the past (Albarella *et al.* 2011, Table 15.11, for household level pig husbandry, see Albarella *et al.* 2007, 298 and Table 216.291). Similarly high figures are alluded to by Roman authors (White 1970, 316). The drove of a 100-200 head kept at Middle Bronze Age Ašnakkum can be associated with one herder (Lion and Michel 2006, 91).

The gestation period of the female pig is close to four months, with offspring weaned from the sow a month to three months after birth (López-Bote 1998, 20, Halstead and Isaakidou 2011, 165). Shorter suckling periods may allow for multiple litters in a year, but it is worth noting that traditional pig herding rarely exceeds two litters per sow per year, and even this may be a rarity with insufficient fodder or harsher climatic conditions (e.g. López-Bote 1998, 20, Albarella *et al.* 2011, Table 15.11, Halstead and Isaakidou 2011, 165-166). Dahl derives a farrowing rate of at least two, if not three litters in a year for a litter from the Third Dynasty of Ur (Dahl 2006, 34 and Fig. 31). Traditional Mediterranean pig breeds will generally produce 6-8 piglets per litter, or around 10 piglets per sow per year (López-Bote 1998, 19, Daza *et al.* 2005, 182). Table 8.48 provides a few modern and historical examples.

	Litter	**Reference**
Greece (20th cent. CE)	5-15	Halstead and Isaakidou 2011, 165
Sardinia (20th cent. CE)	6-12	Albarella *et al.* 2011, Table 15.11
Spain (20th cent. CE)	6-8	López-Bote 1998, 19
New Guinea (20th cent. CE)	4-5	Sillitoe 2007, 338
Roman Italy (2nd-1st cent. BCE)	8	White 1970, 319-320

Table 8.48: Average litter size in free-range pig husbandry

Tropical examples demonstrate lower figures, typically around 4-5 piglets per litter (Sillitoe 2007, 338). Accounting for high mortality rates, especially in free-range herding systems, and the fertility and number of sows within a given drove adds a further range of unknowns. Pigs are only attested in the present dataset through their appearance in cereal fodder records, but could feed on a very wide range of foodstuffs (as outlined e.g. by Roman authors, cf. White 1970, 318-319, also Halstead and Isaakidou 2011, 166-167). A wide range of organic material is utilised in the Bronze Age alluvium, e.g. barley, wheat, bran, and other types of crop processing refuse, e.g. from brewing or date pressing (van Koppen 2006, 185-186). As cereals would have had a range of other uses, barley fodder for pigs should be considered a sign of intensive meat production strategies, further underscored by the amount of cereals issued to individual pigs. Barley fodder rates from Ašnakkum gives rates at 0.5-1.66 *qa* per day, with the higher end of this range reserved for intensive fattening (for similar rates at Late Bronze Age Nuzi, see Lion 2006, 104). Cereals are still a preferred means of fattening pigs in traditional Mediterranean husbandry, though dependent very much on grain available (Albarella *et al.* 2011, 153-154, Halstead and Isaakidou 2011, 166-167).

A rare series of fodder records relating to pigs comes from Ašnakkum (ASZ Series 13), further complemented by grain allotments to a swineherd named Nanizu (Sum. šipa šah) (cf. Talon 1997, 26, Lion and Michel 2006, 91-92). The fodder disbursement records give the daily amount of grain fodder per head as 0.5 *qa* in the *kinâte*-measure, equal to around 400 gram of grain. With the daily ratio being the same for young and adult animals this strongly suggests supplementary feeding directed at intensive meat production. Although the textual sample is relatively small, the variation in numbers would suggest the same (Figure 8.46). While data for the seventh month most likely conflates numbers for young and adult head, the noticeable drop (40 individuals) in the number of adult animals observable in the last two months of the year could reasonably be related to culling. None of the other sites considered here offers the same extensive documentation on pig husbandry as the series from Ašnakkum. We should note a couple of conjectural references, however. The Alalah grain disbursement records contain a single reference, namely an issue of fodder for pig (Sum. šah) (ATaB 41.13) given to a shepherd (Sum. sipa). Additional attestations of this individual as the recipient of substantial amounts of grain suggest that a drove of pigs was fed grain on a monthly basis at Alalah (Zeeb 2001, 381-383). If limiting ourselves to the one entry explicitly concerned with pigs, the ten *pārisu* of barley issued would, following fodder rates seen at Ašnakkum, sustain some 40 pigs for a 30-day period (Lion and Michel 2006, 93-94). A lone disbursement record (Sh 2, Text 86) from Šušarrā lists the issue of piglets for named individuals. Though no numbers are preserved, the text resembles the issuing of piglets for further fattening seen in traditional Greek livestock management (cf. Halstead and Isaakidou 2011, 169, also Lion and Michel 2006, 93).

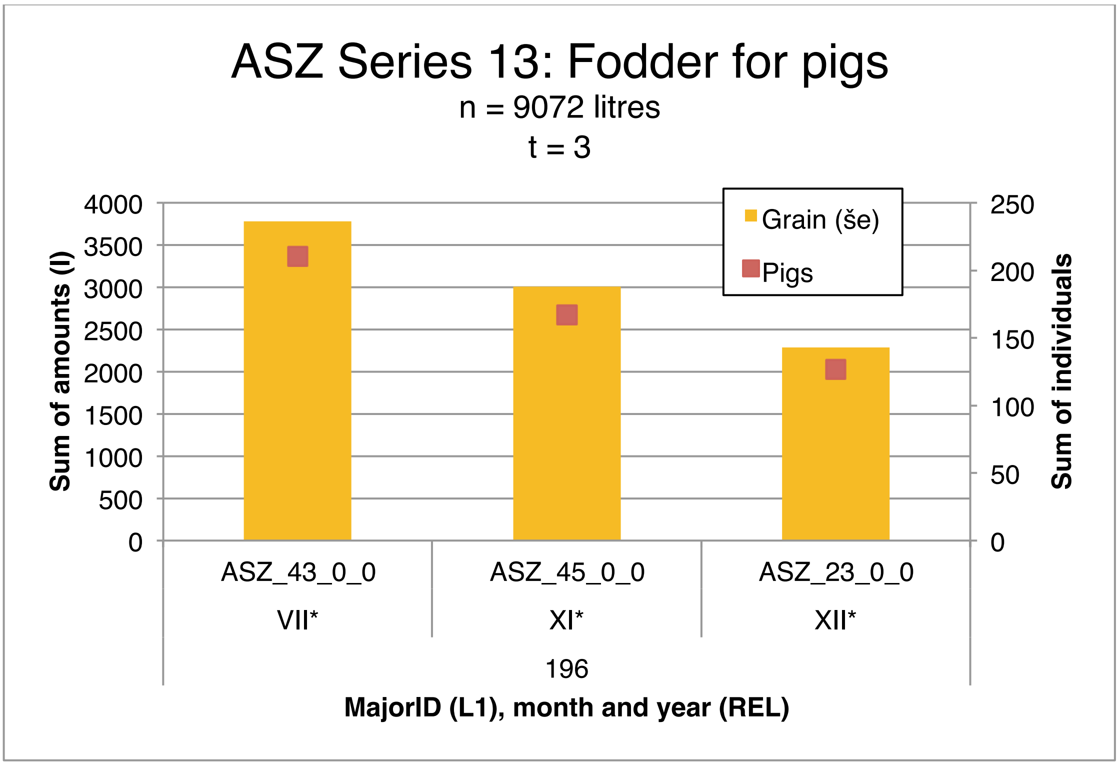


Figure 8.46: ASZ Series 13: Sum of amounts of grain (columns) and sum of individuals (dots) ordered according to months (*qa*/litre ratio of 1:1.2)

An unpublished disbursement record (L85-112) from Šehnā lists lard and a fattened pig (Sum. šah-še) issued for the meal of a queen (Akk. *bēltu*) (cf. Weiss *et al.* 1990, 569-570, Lion and Michel 2006, 94). We have already noted the comparatively abundant stocks of lard (Sum. i_3-šah) at e.g. Qaṭṭarā (see 6.8.3). In conclusion, we can consider the scale of meat production implied by these numbers through some rough estimates. Assuming a Bronze Age sow to produce a very conservative average of six piglets per year, a herd of a 100 sows would be producing 600 piglets a year, yielding c. 20 tonnes meat annually if assuming a low carcass weight of 35 kg (consider here culling numbers provided by Dahl 2006, 34 and Fig. 31). This would translate into 55-60 kg of pork per day, a significant amount of meat that could have fed hundreds of people, or provided for an important source of alternative income.

8.5 Fowl

Fowl includes a range of waterfowl, notably species of duck (genus *Anas*) and geese (genus *Anser*), but also pigeons (order *Columbiformes*) and landfowl (order *Galliformes*), and finally the ostrich (genus *Struthio*). Wetland areas across Syria and Iraq have historically been home to a diverse wildlife. Present-day avian populations in Syria and Iraq number several migrating species of common waterfowl (Gilbert 2002, 32-34). Ducks such as the mallard (*Anas platyrhynchos*), common teal (*Anas crecca*), and pintail (*Anas acuta*) winter in riparian environments across the Bilād al-Šām and the Jazīrah, especially on the Middle Euphrates and the lower Khabür. Geese are equally abundant also further away from major rivers, and count varieties of white-fronted goose (*Anser albifrons* and *Anser erythropus*), especially in the Tigris drainage, and most notably greylag goose (*Anser anser*). The latter is abundant in faunal assemblages from Bronze Age sites in the alluvium, e.g. at Early Bronze Age Abu Salabikh (Eastham 2009) and also further west, e.g. at Tell Nebi Mend (Grigson *et al.* 2015, 171). The primary period for wintering populations in the region lasts from September-October to February-March. Native species of landfowl count francolin (*Francolinus francolinus*) in wetlands, and common quail (*Coturnix coturnix*) and partridge (*Alectoris chukar*) in steppe and upland areas. Pigeons abound in the region, especially the native rock dove (*Columba livia*) that now inhabits urban areas worldwide.

Coherent studies on the economic role of fowl in the Ancient Near East are rare, as overviews have until quite recently relied primarily on iconographic and textual sources with only occasional reference to the zooarchaeological record (see von der Osten-Sacken 2015, 22-25 for an updated and concise overview). Regardless of the historical period under consideration, it is notoriously difficult to ascertain bird species through written sources, as terminologies display extreme changeability over even very short spatial and temporal distances (Veldhuis 2004, 209-210). In general, however, we would expect species of duck and geese to be the principal types of birds targeted for human consumption during the Middle Bronze Age, while pigeons and various species of landfowl would make occasional appearances. Further, the distinction between wild and domestic fowl could be fluid, as with other animal species reviewed here. The upkeep of numerous decoy birds (Akk. *arru*) at Tuttul suggests that fowling was a common practice (von der Osten-Sacken 2015, 249).

Data Type	Detail Data Type	Description
Faunal (Reference)	Bird (Sum. mušen)	Generic. Here generally understood as goose.
	Goose (uz$^{\text{mušen}}$)	Goose (*Anser* sp.), the most common type of bird appearing in the dataset, and regularly grain-fed (cf. von der Osten-Sacken 2015, 244-250)
	Goose (uz-tur$^{\text{mušen}}$)	
	Goose (mušen-gal)	
	Ostrich (Sum. ga-nu^{11})$^{\text{(TUT)}}$	Arabian ostrich (*Struthio* sp.)
	Crane (Sum. *kurkû*)$^{\text{(SZE)}}$	Crane (*Grus* sp.).
	Bird (Sum. bad-še-nu)$^{\text{(TUT)}}$	Unidentified.
	Bird (Sum. har-har)	Unidentified (cf. Veldhuis 2004,
	(Akk. $^{\text{mušen}}$*ši'u*)	Unidentified
	Bird (Akk. *kurmadilu*)$^{\text{(TUT)}}$	Unidentified (cf. Veldhuis 2004, 265).
	Bird (Akk. *qaqû*)$^{\text{(TUT)}}$	Unidentified.

Table 8.49: Detail Data Types for birds

We should expect a relatively high level of intermixing of semi-domestic and wild geese. The small sample of bird remains from Abu Salabikh pointed to grey lag goose as the best represented of all bird species, and wintering flocks of geese would have been a common sight throughout much of the region (Eastham 2009, 101). The predominant type of fowl in the dataset (Table 8.49) and in the cuneiform record more generally is goose (Sum. uz$^{\text{mušen}}$, Akk. *ūsu*). Other terms likely qualify specific varieties of wild or domestic goose, e.g. uz-tur$^{\text{mušen}}$, and the Assyrian equivalent mušen-gal (von der Osten-Sacken 2015, 244-250). The generic mušen generally appears to refer to goose, at least when judging from social or economic context. There is no clear evidence of duck (*Anas* sp.), although Sumerian bad-še-nu appearing at Tuttul is referred to as a decoy bird (Akk. *arru*) on one occasion and should therefore be a fairly common species of *Anatidae*.

Ducks have been hunted since the beginning of time, have a fast growth rate, and can, under domestication, provide a ready and easily replenished source of meat (Luff 1999, 517). In contrast to geese, however, ducks have historically proven difficult to domesticate, and the earliest affirmative evidence for the permanent keeping of ducks in the West is commonly dated to the Roman era. Ostriches (here the, now extinct, Arabic ostrich *Struthio camelus syriacus*) appear more sparingly in our sources. They are readily recognisable in the archaeological record, mainly in iconography and through ample finds of ostrich eggs in human burials (Herles 2007, Herles 2012). Royal inscriptions attest to the importance attributed to ostrich eggs, especially in sources from Middle Bronze Age Mari. Here, the occasional find of ostrich eggs in the steppe or desert above the river valley received marked attention in royal correspondence (Stol 2012), while a letter from the same location regrets the lack of ostriches at hand (ARM 28, Text 33). It is not impossible to keep ostriches in a domestic setting, as seen at Tuttul where three ostriches were allotted fodder from the storages for an entire month (cf. KTT 156). Unpublished texts from the Middle Assyrian *dunnu* at Ṣabī Abīaḍ further north in the Balīkh Valley mention fodder for ostriches (Wiggermann 2000, 200). The remainder of birds appearing in the dataset cannot be identified with any meaningful certainty. Crane, Sum. kur-gi, Akk. *kurkû* (probably the common crane *Grus grus*) appears in a ritual context at Šehnā (Vincente 1991, Text 137).

8.5.1 Keeping and feeding birds

As with other breeds of livestock, we know primarily of fowl from fodder records. Keeping birds occur in divergent contexts at the level of managerial recording, but the scale of such enterprises within the various household economies considered here is relatively similar. Within palatial structures, we regularly find birds and, sometimes, game held in the forecourt (Akk. *kisallu*), e.g. at Ašnakkum, where between 20-30 geese (Sum. mušen-gal) and one to seven gazelles (Sum. maš-da$_3$) receive daily supplements of barley fodder regularly throughout the year (Talon 1997, 34, Rattenborg 2012, 38-39). Variation in the numbers of animals suggests regular culling for meat consumption (Figure 8.47).

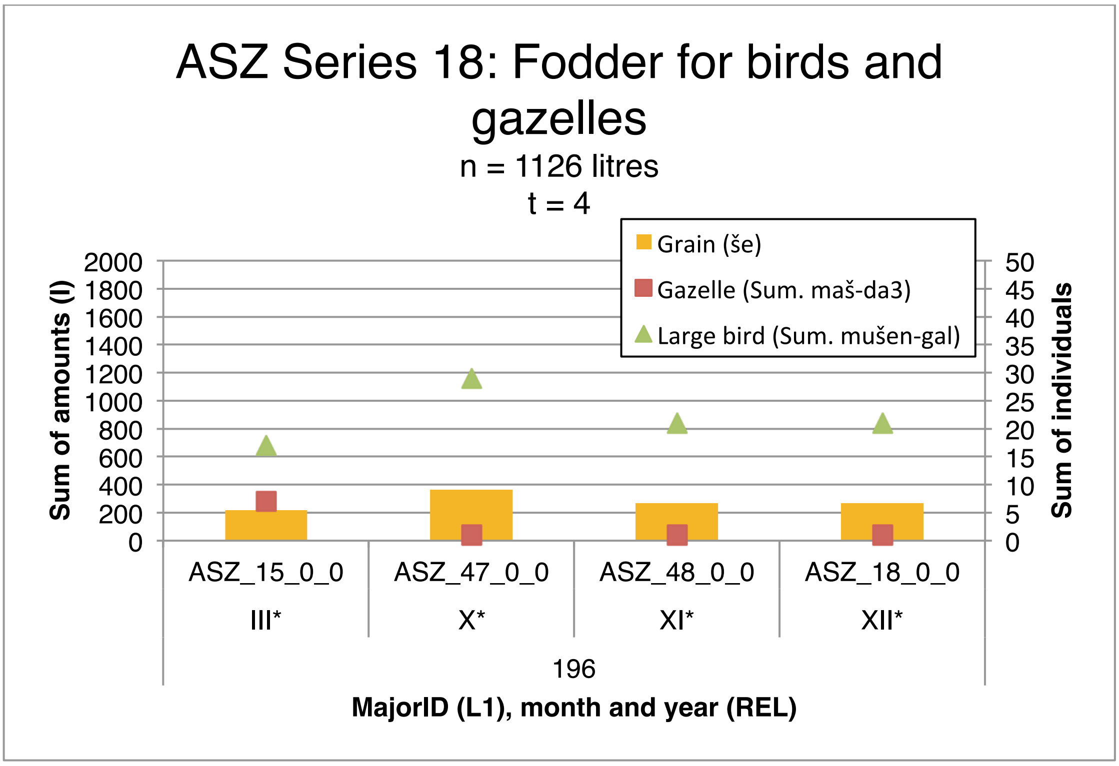


Figure 8.47: ASZ Series 18: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:1.2)

At Tuttul, a group of decoy birds, including varieties of geese (Sum. uz^{mušen} and uz-tur^{mušen}) and an unidentified type of avian (Sum. bad-še-nu) is fed barley daily (Figure 8.48). In addition, we should consider KTT 146, a disbursement record accounting for barley fodder for 300 birds, again presumably geese, (Sum. mušen) being taken to Mari. Fodder rates for birds agree across the region and further mirror rates found in the alluvium and throughout the Bronze Age more broadly (von der Osten-Sacken 2015, 250). The standard rate for geese (Sum. mušen-gal and uz^{mušen}) is 1/3 *qa* of barley per day in Ašnakkum and Tuttul, with higher rates for goslings (Sum. uz-tur^{mušen}) at 0.5 *qa* per day. Data from Alalah, once again, informs us on the amount of fodder issued per month, but not the number of animals fed (Figure 8.49). Assuming a rate of half a *qa* per day, issues of emmer and barley for geese (Sum. uz^{mušen}) in the range of 1 to 6 *parisu* per month suggests 4-24 geese, or 6-36 if applying the lower rate of 1/3 *qa* (Zeeb 2001, 264-270).

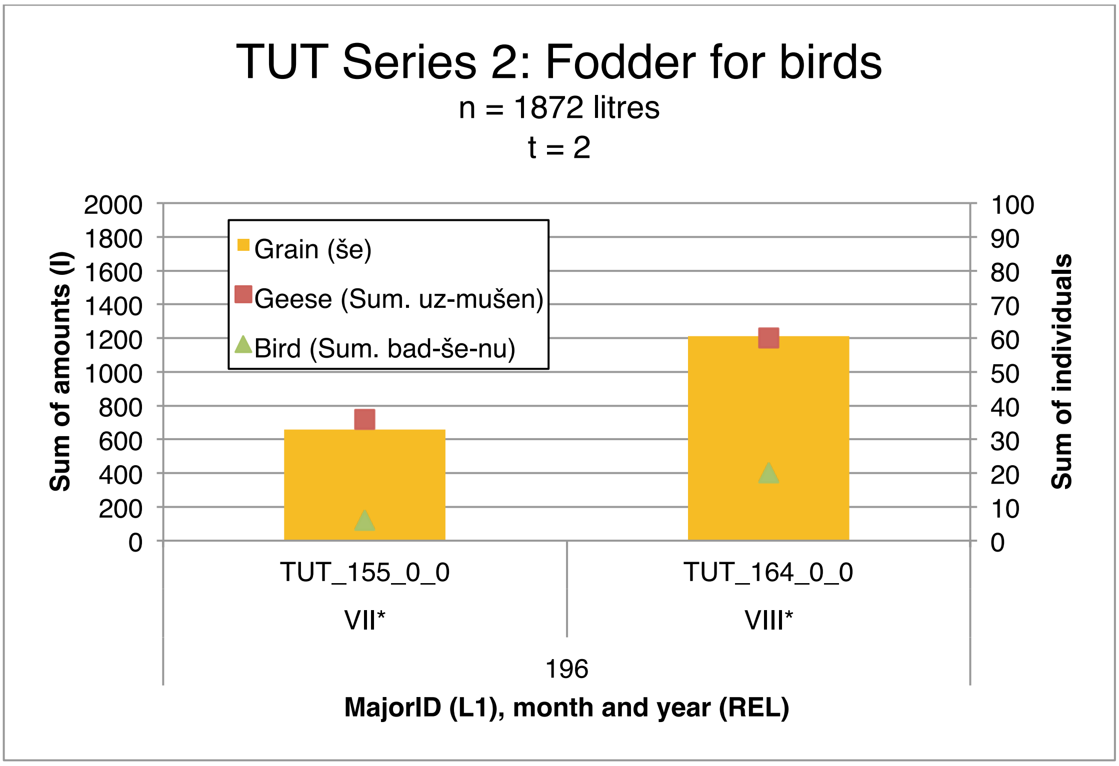


Figure 8.48: TUT Series 2: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:1.2)

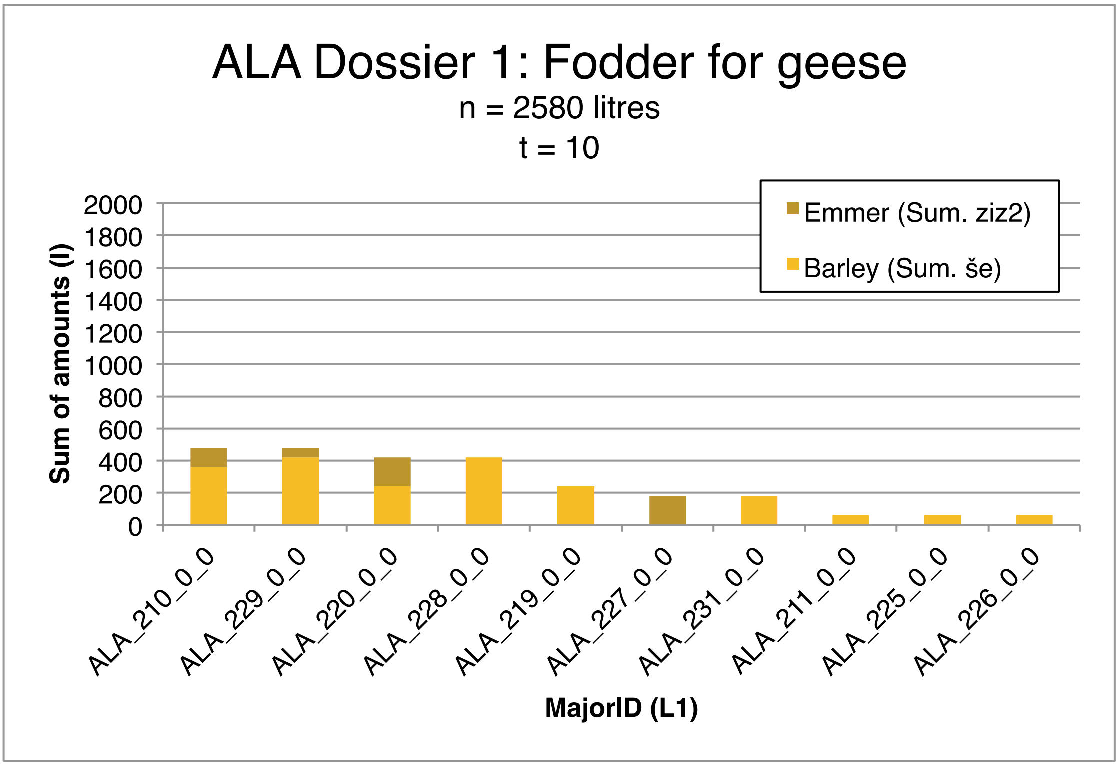


Figure 8.49: ALA Dossier 1: Sum of amounts of grain (columns) (*qa*/litre ratio of 1:1)

8.6 Fish

Fish can be found in smaller streams and in abundant numbers in major river systems, e.g. in the Middle Euphrates, but also in the Khabūr River. Reptiles are more exotic today, though their widespread distribution in antiquity should be noted. Large freshwater turtles (*Rafetus euphraticus*) are found in the Tigris-Euphrates basin as far upstream as the Taurus and Zagros foothills, and also attested in the upper Khabūr River, while terrapins and tortoises can be found in more remote areas (see Martens 2008, 53 for a recent study). Early Bronze Age depictions of turtles found at Tall Taya is but one example of their presence also in antiquity (Reade 1968, 250). Freshwater fish and their contribution to the Bronze Age diet is extremely poorly documented in the general literature, applicable, with certain exceptions, to the alluvial plain also (Potts 2012, 221-223, for a study of fishing practices during the Third Dynasty of Ur, see Englund 1990). This is due to a still inchoate body of knowledge on ichtyofauna in the Tigris-Euphrates drainage more generally (Jawad 2012, see now Coad 2010), and especially a result of technical shortcomings in archaeological fieldwork. Proper retrieval of fish remains from archaeological strata requires a sustained programme of sieving (Potts 2012, 221-223).

The recent synthesis on the ichtyofauna of the Khabūr River provided by Krupp and Schneider (2008) offers a good point of reference for an appreciation of freshwater fish in the Jazīrah more generally, and should be briefly summarised here. The Khabūr River is home to 27 endemic taxa of fish, of which the vast majority (19) are carps or barbs (family *Cyprinidae*), alongside two species of catfish (family *Sisoridae*) and a handful of taxa from other families (Krupp and Schneider 2008, 42-47). Considered against the known fauna of the Tigris-Euphrates drainage, some 60 taxa in total, and accounting for potentially significant variation in salinity, waterflow and seasonal variations in temperature, this selection can be deemed generally representative for the Khabūr River ecosystem (Krupp and Schneider 2008, 49). It is further matched neatly by zooarchaeological data from further upstream, at Brak, where species of *Cyprinidae* account for 60% of the total assemblage, with catfish the second important taxon (Jacques *et al.* 2003, 425-428). The find of imported salt-water fish at the same site is another interesting feature, suggesting that conserved fish may have been transported over long distances (Roselló Izquierdo and Morales Muñiz 2001). The Brak assemblage, by far the largest body of data on fish fauna in the Bronze Age Jazīrah and beyond, derives primarily from late 3rd and early 2nd millennium BCE contexts, and therefore holds particular importance when turning to the textual sources. While there is a plethora of terms related to fish in the cuneiform record, it is notoriously hard to apply these to any discrete taxonomical reality. A basic division utilised by Englund recognises size according to metrological patterns. Some types of fish are recorded, like bulk commodities, in volume capacities, while others, logically speaking larger specimens, are counted (Englund 1990, 208). A review of types of fish in textual sources from the Middle Bronze Age Jazīrah suggests species identifications largely in agreement with the archaeozoological record sketched above, thus with an emphasis on carps, barbs, and catfish (Lion and Michel 2000). Epistolary sources do not necessarily offer a more substantial degree of accuracy, as a friend of Iltani demonstrates:

> "Just as your husband Aqba-hammu knows of the small fishes (ku$_6$ tur-tur) from Qaṭṭarā and Karanā, I myself have always loved the large fish (ku$_6$ gal) from Šubat-Enlil, Ekallātum, Mari, and Babylon." (OBTR 42 v.11-r.06)

At Šehnā, which offers the only administrative records concerned with fish available from the dataset, only two varieties, Sum. ka-mar^{ku6},Akk. *kamāru* and Sum. zahan^{ku6}, appear, both in very small quantities. The former, rather than being a distinct species, may refer to preserved or smoked fish (Lion and Michel 2000, 78-80, Sanati-Müller 1989, 239). The meaning of the latter is obscure. Finally, 'shrimp' (Akk. buru$_5$ *tâmti*, literally 'water cricket') appears both in disbursement records from Šehnā and in a stored context at Qaṭṭarā (OBTR 204). There are only sparse clues as to the nature of this species in the literature (see the brief discussion by Lion and Michel 2000, 80-81), but the term should essentially refer to either saltwater shrimps or prawns, e.g. *Metapenaeus affinis* which is a common product of traditional fishing in the marshes of southern Iraq (Salman *et al.* 1990, 79-80) or freshwater crayfish, e.g. *Astacus leptodactylus*, which may be in evidence at Neolithic settlements in the Upper Tigris drainage (Kozlowski 1989, 30). The former seems more likely given the scribe's preference for measuring these in volumes, e.g. the 5 *qa* recorded in Vincente 1991, Text 144. A letter to Iltani from a relative residing in Sippar, in the northern part of the alluvial plain, specifically mentions a basket of shrimps (Sum. buru$_5$ ab-ba) sent north to Qaṭṭarā (OBTR 134, cf. Dalley 1984, 82). On a par with fresh vegetables, one might suspect the lack of documentation on fish to be related to the poor storage qualities of such resources, but it should be noted that the documentation presented here still concerns very small amounts.

8.7 Animal fattening

Fattening of animals, either to counter attrition in draught animals or to intensify meat production prior to consumption, forms an integral part of all household organisations encompassed by the current study. A fattening house or stall (Akk. *bīt marî*) appears at sites in the Jazīrah, e.g. at Tuttul, Ašnakkum, Šehnā, and Qaṭṭarā, and comparable practices emerge from assemblages at Alalah and Šušarrā. Fatteners (Akk. *mārû*) are found in grain ration records, e.g. a group of eight men and three boys at Ašnakkum (e.g. OBTCB 12). The relative scale of livestock being fattened for later consumption, at least when judging from the few examples presented here, is generally minor when considered against overall livestock holdings, and certainly no match for the number of pigs and fowl discussed earlier. There is no clear association between fattening house and feeding of pig or fowl at the sites discussed here, an interesting point to keep in mind when identifying areas of intensive meat production. Further south, at Mari, a letter (ARM 5, Text 46) alludes to a fattener tasked with the feeding of sheep (Sum. udu) and fowl (Sum. mušen), but it is not clear if these relate to the same physical institution.

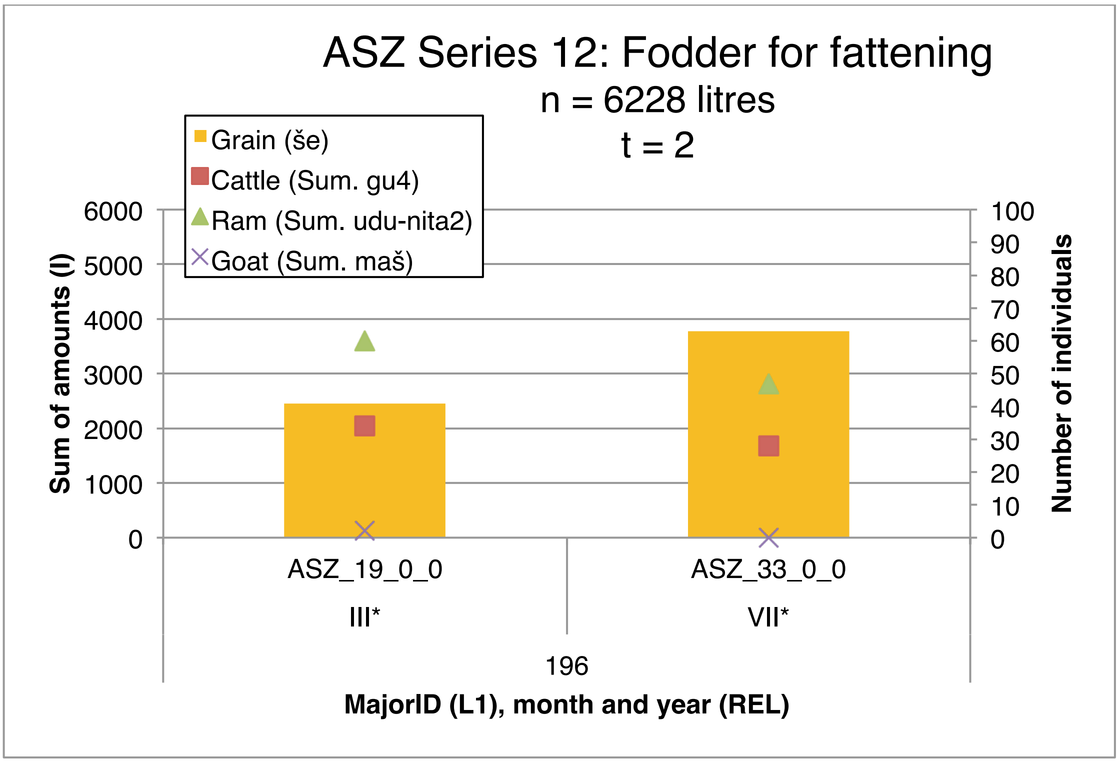


Figure 8.50: ASZ Series 12: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:2)

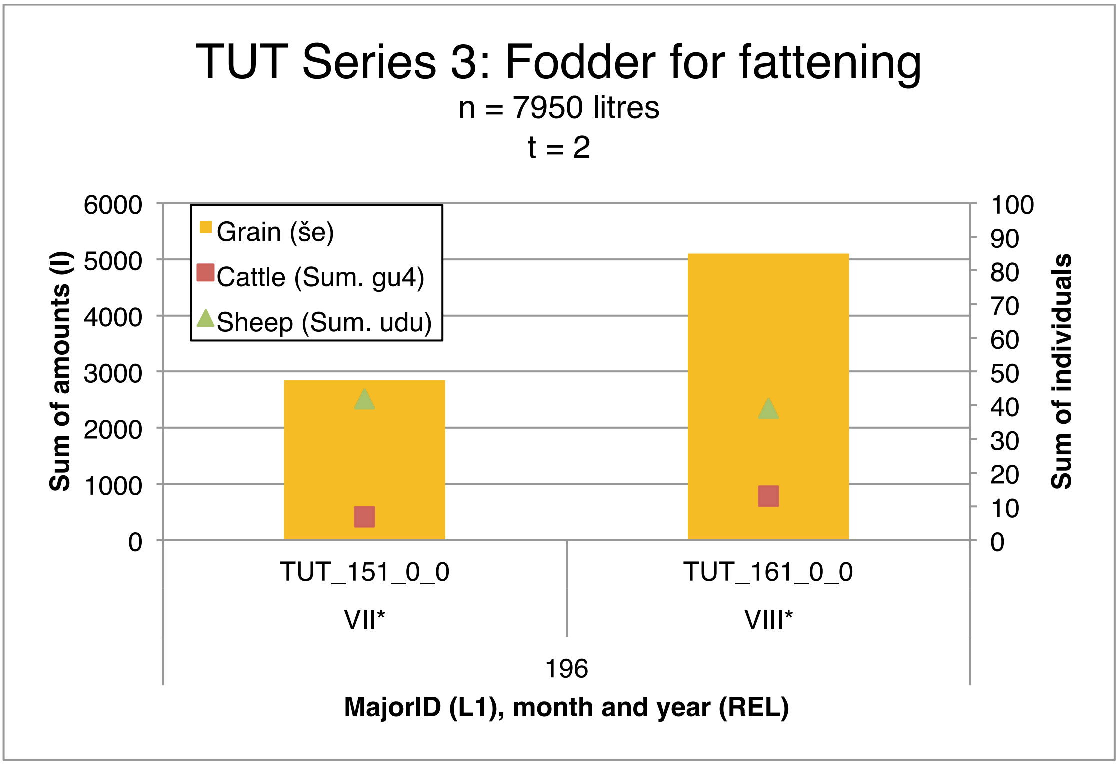


Figure 8.51: TUT Series 3: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:2)

Examples covered by the present dataset demonstrate similar patterns although culling practices especially cannot be deduced with any certainty. Both at Ašnakkum (Figure 8.50) and Tuttul (Figure 8.51), the fattening house is concerned with cattle, sheep, and goat. A lone fallow deer (Akk. *ayyalu*) is kept at the latter site also. The majority of livestock kept in the fattening house are rams, with smaller groups of cattle and young animals. Fattening could also serve to counter attrition to draught oxen and breeding stock, thus for example the 32 plough oxen (Sum. gu_4-apin) found in OBTCB 30 and the 11 ewes appearing in KTT 151. Of a total 75-100 head at Ašnakkum and c. 50 at Tuttul, rams make up more than half in all records, a percentage that keys in well e.g. with culling of male sheep for offerings discussed earlier.

8.8 Horses, donkeys, and onagers

Equids are relative latecomers to the established livestock regimes of the Bronze Age. On present evidence, the horse (*Equus caballus*) was domesticated in the steppes of West Asia in the 4th millennium BCE and only appears in the Middle East centuries later (Outram *et al.* 2009, Achilli *et al.* 2012). The domesticated donkey (*Equus asinus*) originates in North Africa and arrives in the Middle East in the beginning of the 3rd millennium BCE (Rossel *et al.* 2008, Kimura *et al.* 2013), though a distinction between wild and domestic donkeys seems to be in evidence already in proto-cuneiform texts of the late 4th millennium BCE (Postgate 1986, 200-201). Partially overlapping morphological characteristics and the presence and interbreeding of domesticated stock with several wild relatives, namely the Asian wild ass or onager (*Equus hemionus*) and the African wild ass (*Equus africanus*) complicates the identification of distinct species in the archaeological record (Arbuckle 2012, 213, Grigson 2012). Crossbreeding donkeys and the wild onager across the plains of the Jazīrah yielded a hybrid referred to as Sum. anše-kunga, Akk. *parû*, which was particularly valued for its strength and swiftness compared to ordinary donkeys, and typically employed in elite contexts (Postgate 1986, 200, Weber 2008, 514-516).

The basis of equid nomenclature in the cuneiform record is Sum. anše (Akk. *imēru*) for donkey. The same sign, with qualifications, forms the basis for horse (Sum. anše-kur-ra 'mountain donkey', also occasionally anše-zi-zi, Akk. *sisû*), mule (Sum. anše-nun-na, Akk. *damdammu*), and donkey-onager hybrids (Sum. anše-kunga, Akk. *parû* or anše-la-gu) (Postgate 1986, 195-198). No specification according to age occurs in the present dataset (Table 8.50), apart from 'foal' (Sum. amar-anše), but records from the Third Dynasty of Ur demonstrate parallels to age and gender categories also employed for cattle, i.e. suckling, first-, second, and third-year foals (Stepien 1996, 29-30, Zarins 2014, 176-188). There are only rare references to different breeds below the level of species mentioned earlier, but archaeological data suggests at times significant variation in body size and stature across different regions and periods from an early point (Weber 2008, 514-516, Shackelford *et al.* 2013). Textual sources offer further insights, e.g. the black donkey (Akk. *imēru ṣallāmu*) that was held in high regard by Old Assyrian merchants (Dercksen 2004, 258). Išme-Dagan, in a letter sent to Mari (ARM 1, Text 132), remarks upon the qualities of hybrid breeds from towns on the southern slopes of the Jabal Sinjar and further west, and then goes on to lament the inferior size of jennies from the Upper Land, presumably the Khabūr plains. Zooarchaeological analyses have demonstrated some difference in size of donkeys from the Jazīrah and the alluvium respectively, with Early Bronze Age specimens from the latter area being markedly larger (e.g. Clutton-Brock and Davies 1993, 210, but see discussion by Weber 2008, 514-516). The use of horses appears relatively limited prior to the middle of the 2nd millennium BCE (Clutton-Brock 1992, 85). While known, they are comparatively rare in the records down to and including the time of the Third Dynasty of Ur (Postgate 1986, 197).

Data Type	Detail Data Type	Description
Faunal (Reference)	Donkey (Sum. anše)	Domesticated donkey (*Equus asinus*), with gender, age, and work qualifications.
	Jack (Sum. anše *rākibu*)(ASZ)	
	Jenny (Sum. eme5-anše)(ASZ)	
	Donkey foal (Sum. amar-anše)	
	Pack donkey (Sum. anše-gun2)(ASZ)	
	Equid (Sum. anše-kunga)(SZE)	Presumably donkey-onager hybrids (cf. Weber 2008,
	Equid (Sum. anše-la-gu)	
	Mule (Sum. anše-gir2-nun)(ALA)	Donkey-horse hybrids.
	Mule (Sum. anše-nun-na)	
	Horse (Sum. anše-kur-ra)	Domesticated horse (*Equus caballus*)
	Horse (Akk. *sisû*)(ASZ)	

Table 8.50: Detail Data Types for equids

Moving into the Middle Bronze Age we find the first reliable references to horse riding both in the alluvium and in the Jazīrah plains (Eidem 2011a, 80-81, Zarins 2014, 204-205). Donkeys, in contrast, were widely used, then as now. We have already touched upon their importance in agricultural transport, but the same qualities naturally extended to cover more extensive infrastructures of communication and exchange. Sturdy, sure footed, and able to carry heavy loads, donkeys formed the backbone of Old Assyrian trading enterprises extending across the Jazīrah and into Anatolia (Dercksen 2004, 255-266). The extent to which they were used for ploughing is more elusive, however. There is abundant evidence of donkeys tasked with ploughing in the 3rd millennium BCE alluvial plain (Zarins 2014, 188-192) and at 24th cent. BCE Tall Baydar in the western Khabūr Basin (Widell 2003, 718-720), but no references at all to this kind of draught work in the present dataset and across the Middle Bronze Age Jazīrah more generally. This seems rather odd in practical terms, but it is hardly a consequence of the composition of the textual record. As already seen, the dataset holds extensive documentation on plough oxen and fodder records for draught animals. While not conclusive, it seems unlikely that documentation on ploughing donkeys should have escaped us completely. Donkeys could be and were used for ploughing on light soils in the antique world, as demonstrated in the writings of Roman authors (White 1970, 293-294, see also comments by Halstead 2014, 36).

Mating patterns in wild or feral donkey herds demonstrate some seasonal preference towards summer months. The gestation period of the female donkey is c. 12 months, while weaning generally does not occur until the foal is 12-14 months old (Grinder *et al.* 2006, 4). The pregnancy rate in pasturing donkey herds is generally high (e.g. Henry *et al.* 1991), but the long gestation period and subsequent weaning make for a relatively modest production of foals. Modern breeders will usually expect a reproduction rate of 75% of the adult female population of a donkey herd, but Roman figures are more conservative, usually expecting a foal only every second year (White 1970, 296, Isager and Skydsgaard 1992, 87).

	Type	**kg/day**	**Reference**
Khabūr Basin (18th cent. BCE)	Donkey	1.56	OBTCB 13
	Donkey foal	0.78	OBTCB 13
	Pack donkey	1.56	OBTCB 15, 16, 21, 27
	Equid (Sum. anše-la-gu)	2.34 – 3.9	OBTCB 22, 65, 72, 74
	Mule (Sum. anše-nun-na)	5.85	OBTCB 65, 74
	Horse (Sum. anše-kur-ra)	0.78 – 3.9	OBTCB 22, 65, 72, 74
South Iraq (21st cent. BCE)	Equid (Sum. anše-kunga2)	1.625 – 3.25	Zarins 2014, Table 23
	Horse (Sum. anše-kur-ra)	3.25 – 3.9	
Khabūr Basin (24th cent. BCE)	Plough donkey (Sum. anše-apin)	0.8125	Widell 200 727-729
	Onager (Sum. anše-edin)	1.3	
	Equid (Sum. anše-amaš)	1.95	

Table 8.51: Grain fodder rates for equids

While attestations on the presence and widespread use of donkeys are common across the study region, rearing and caring for donkeys is poorly documented in the administrative record. A record of barley fodder (OBTCB 13) issued for a donkey herd in late winter forms a rare exception, and is no doubt the product of a supplementary feeding strategy mirroring the upkeep of cattle breeding stock seen earlier. The text relates to a donkey breeding pack, counting 4 breeding jacks (Akk. *rakābu*), 90 jennies (Sum. eme5-anše), and 40 foals. Assuming suckling foals, herd proportions agree with a low reproduction rate of c. 50%. Otherwise, feeding practices generally reflect those seen for the other principal group of draught animals, namely cattle. When fed, equids receive supplementary cereals in proportions much similar to draught cattle (Table 8.51). Grain is the only attested fodder type recorded at Ašnakkum, but vetch is a common element of horse and donkey fodder in disbursements from Alalah.

The fodder records from Ašnakkum touch on three groups of equids, namely donkeys, hybrids, and horses. Fodder for a group of five, on one occasion seven, pack-donkeys is accounted for in four texts (ASZ Series 14), dating to spring and high summer of the year of Adad-bānī (REL 196) (Figure 8.52). Horses and hybrids are accounted for separately, namely in a series of two texts (ASZ Series 15) from late autumn and early winter (Figure 8.53). The latter group accounts for a total 10 hybrids (Sum. anše-la-gu), 20 horses (Sum. anše-kur-ra), and three teams (Akk. *ṣimdu*). Apart from the horses and hybrids that form part of Yasmah-Addu's entourage on the occasion of his visit to the town the following spring (OBTCB 65 and 74), no other equids appear in grain disbursements from Ašnakkum.

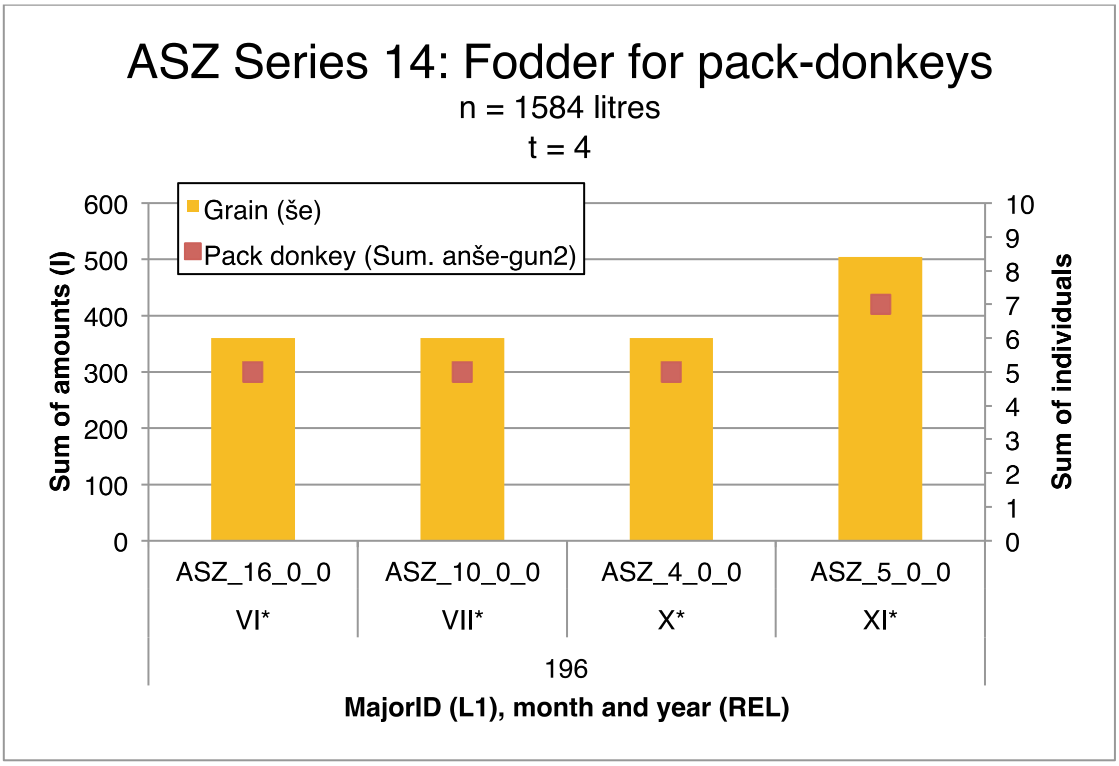


Figure 8.52: ASZ Series 14: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:2)

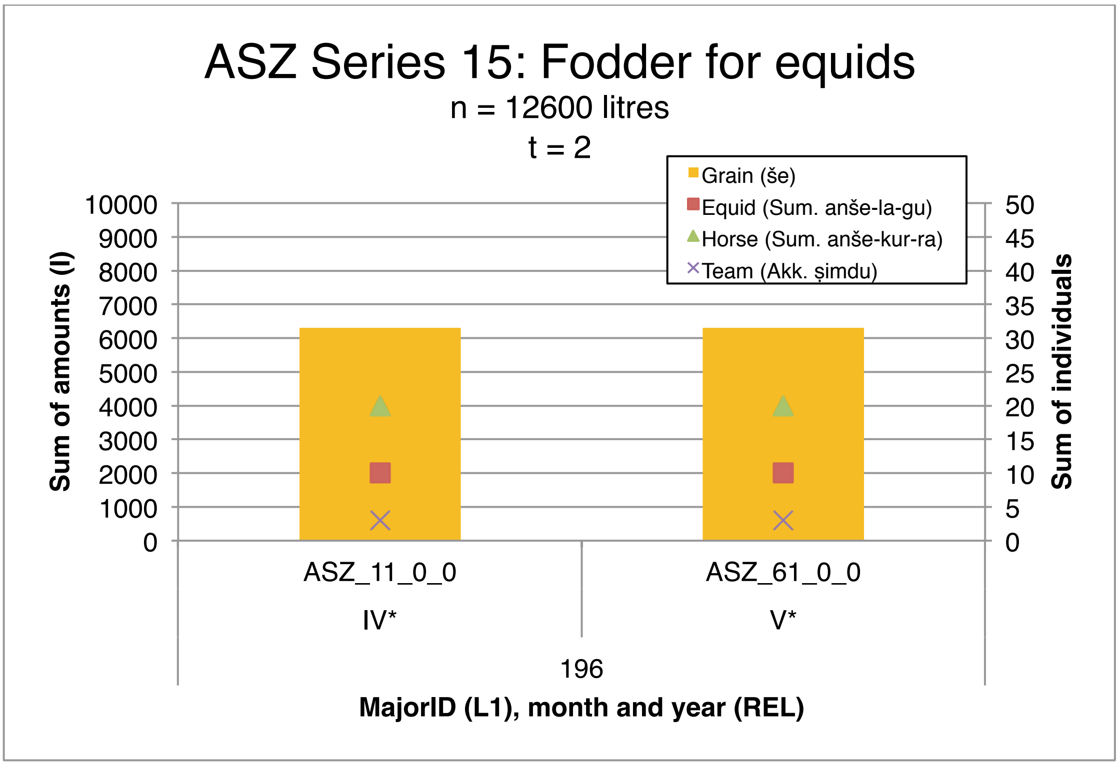


Figure 8.53: ASZ Series 15: Sum of amounts of grain (columns) and sum of individuals (dots) (*qa*/litre ratio of 1:2)

These texts point to a feeding regime mirroring practices seen for cattle, e.g. cereal fodder for draught animals and supplementary fodder during winter for breeding herds, as suggested by the lone group of donkeys and foals attested in OBTCB 13. Larger equids used for transport, i.e. horses and hybrids, receive higher rates of fodder, a logical consequence of their presumably larger body size, but we should recall here also the discrepancy between daily fodder rates for plough and cart oxen (8.1.2). Considering the number of foals that should be produced at Ašnakkum each year, we would expect a considerably larger number of donkeys to be available to the institutional household than attested here, indicating that the majority of donkeys relied entirely on grazing rather than supplementary barley fodder, or were sold off. The disbursement records from Alalah contain ample references to horses and donkeys, but again, it is hard to glean the number of head from the bulk amounts given in individual entries. If we gather together issues of grain and vetch for groups of equids contained in ALA Dossier 1 (Figure 8.54), and assume a rather low average grain intake of two *qa* per head per day, then amounts issued point towards c. 25-50 horses per month, a reasonable figure when compared to Ašnakkum.

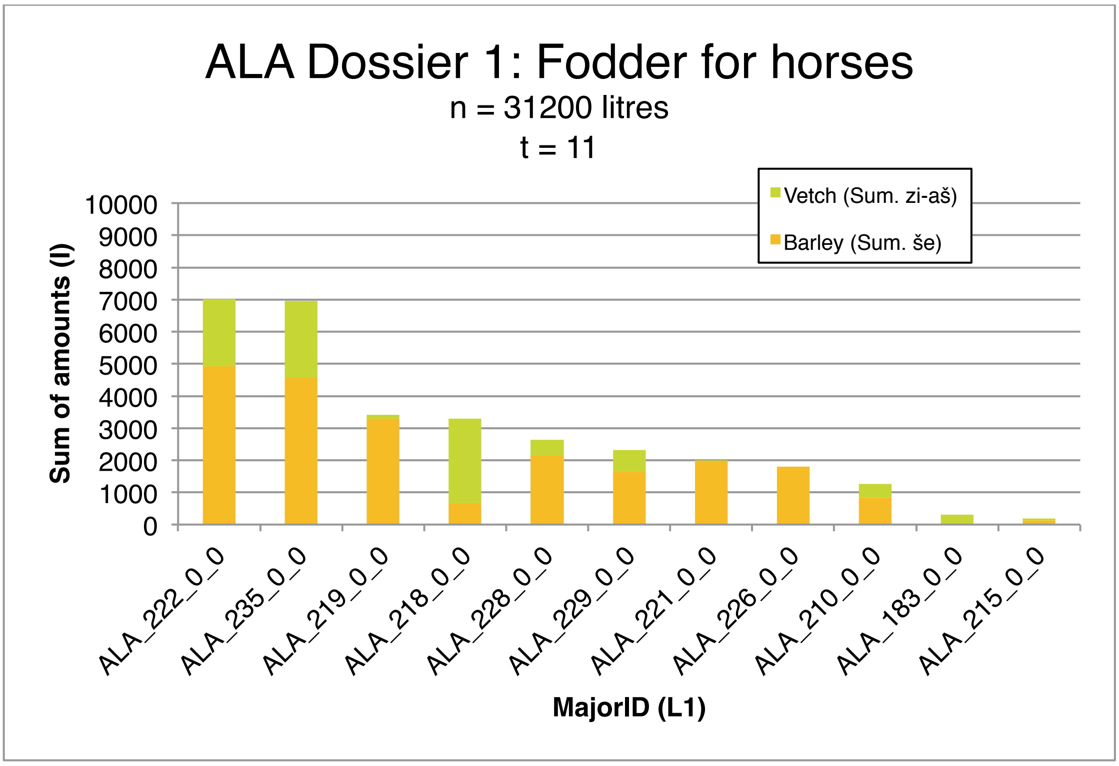


Figure 8.54: ALA Dossier 1: Sum of amounts of grain and vetch (columns) (*qa*/litre ratio of 1:1)

8.9 Grazing

Within the settled landscape, finding and utilising pasture involved recognition of a number of different actors and locales. Access to grazing land was a matter of constant negotiation, as demonstrated by the following letter from Šehnā, where a relative of the local king asks for diplomatic assistance in order to gain access to pasture for his sheep:

> "To Till-Abnû, my elder brother, say, thus Niqmi-Adad, your younger brother: Previously I wrote to you concerning my sheep, (and) you said: 'Place your sheep in the town of Ahanda, lead (them) there.' This my elder brother said to me. The sheep (were ready) to be led to the town of Ahanda, (but then) the god struck my sheep, and until I appeased the god, I held back (the sheep), (but then) the sheep of the town of Nilibšinnum were placed in the town of Ahanda. As I had appeased the god, the chief shepherd (Akk. *utullu*) Yaqbīya indicated the town of Kuzāya for the sheep, and the sheep were placed (Akk. *nadû*) in Kuzāya, but the *sugāgu* of Kuzāya chased away my sheep. Now will my elder brother please send one of his servants with my servant so that they will not chase away my sheep in the town of Kuzāya."
>
> (RATL 85, cf. Eidem 2011a, 136-137)

Following Eidem's reconstruction of the pertinent historical geography (Eidem 2011a, 164), the toponyms in question probably relate to the northern central part of the Khabūr Basin, a day's journey or more west of Šehnā. Overall, there are ample references to livestock being grazed at some distance from their owners, a trait that should warn us against a too rigid application of the traditional schematic of local settlement, surrounding fields, and adjacent pasture. While sheep and goat herding may cover vast areas, attestations of Ašnakkum cattle herds grazing on the banks of the Khabūr River some 50 kilometres away, or the 1,200 head in the Balīkh with which Yasmah-Addu, in Mari 300 kilometres down the Euphrates, was so concerned, certainly demonstrate that pasture for bovine livestock was equally sought after, and covered comparable distances (Figure 8.55).

Even if the regional environment of the Jazīrah has seen considerable change through the Holocene (2.3.1), some basic constraints dictated by the annual cycle and precipitation patterns remain fairly constant and should be considered with regards to pasture. With sufficient autumn and winter precipitation, the drier tracts of the steppe and desert provide for lush pastures in winter and early spring, and allows for livestock grazing as long as sufficient surface water remains available (Suttie *et al.* 2005, 451-455). 20th century Syrian herders of sheep and goat usually move their herds into the steppe (Ar. *al-Bādīah*) below the Jabal al-Ruwāq, Jabal Abu Rujmayn and Jabal Bišrī following the first rains in November, and stay there until April or May to forage on available shrubs and grasses (Wirth 1971, 256-258 and Map 211). Similar paths of transhumance appear further east, on the ’Afār Plain and further south into the Wādī Tharthar (Dillemann 1962, 73-75, Oates 1968b, 3-4). This same transitional zone, roughly expanding from the limits of sustainable dry-farming cultivation and into the drier steppe where rainfall lingers at or somewhat below 200 mm per year, was the basis of intensified agro-pastoralism in the late 3rd millennium BCE, utilising a boom-or-bust combination of barley cultivation and sheep and goat pastoralism (Wilkinson *et al.* 2014, 56-57). By May, when the steppe dries up, the herds return to settled areas with perennial water supplies and graze on available pasture, e.g. river meadows, upland steppe, e.g. the basalt plateaus in the Khabūr Basin or adjacent hilly terrain, but more importantly on the stubble of the harvested winter crop and on lodged or failed crops (Omer 2011, 23-24, Wilkinson and Hritz 2013, 26). Herds may be offered another round of stubble in late summer following the harvest of any summer crops, but forage supplies otherwise deteriorate towards early autumn.

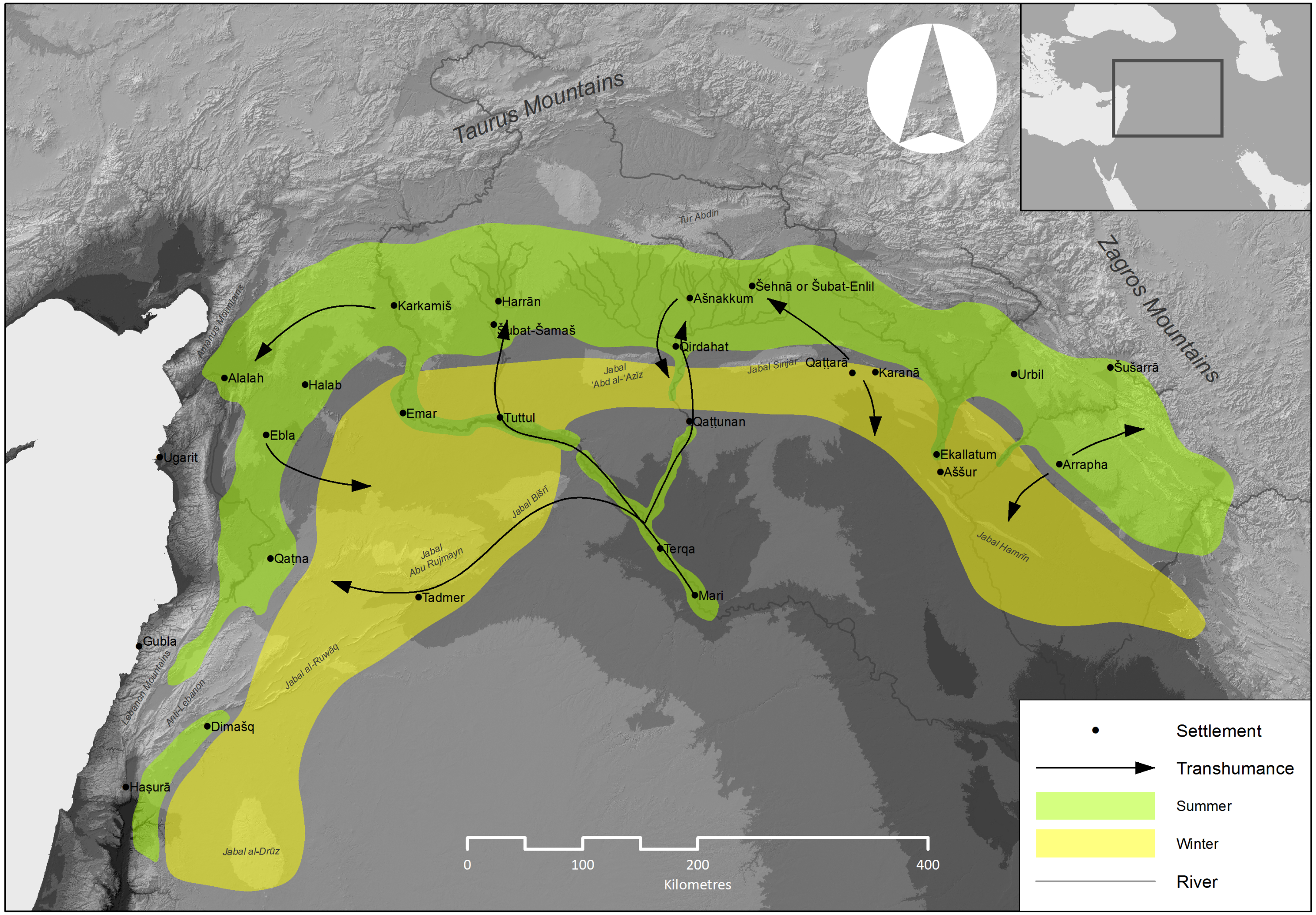


Figure 8.55: Approximate zones of winter and summer pasture and Middle Bronze Age examples of transhumance (zone outlines drawing on Blunt 1968 [1879];Wirth 1971, 256-258 and Map 11)

The key advantage of this transhumant system is the ability to feed livestock on a dispersed selection of grassland, thereby expanding forage resources and countering drought or crop failure. The utilisation of the above geography by pastoralists of past societies should not be adopted uncritically, but it does serve to sketch some basic environmental opportunities and constraints (Hole 1980, 120). Kraus observes an absence of distinctive terms for summer and winter pasture in cuneiform sources generally (Kraus 1976, 73-74), but we should note the implied movement of herders and their flocks at Nuzi, where shepherds received grain rations for the winter, but not for the summer, perhaps implying migration into upland hills (Morrison 1981, 268-269). The pattern of transhumance outlined here is a system almost exclusively exploited by sheep and goat (and, on a later and more extensive scale, by camels, cf. Wirth 1971, 254-256). Cattle require regular access to much more substantial amounts of water, and are therefore commonly grazed much closer to perennial water resources and sedentary communities (Dahl and Hjort 1976, 238-239). Proximity of distinctive eco-zones may circumvent such constraints, e.g. the grazing of cattle from the environs of Jerusalem in the Jordan Valley in early spring and early autumn (Dalman 1928-42, VI, 164).

8.10 Reaching beyond the fold: observations on livestock holdings

I have surveyed documentation on livestock through a basic division between species herded for their secondary products, i.e. cattle, sheep and goat, and species exploited as a source of meat and fat, especially pig, but also fowl and fish. It should be noted that the institutional household also relied on wild game animals, e.g. gazelles (Sum. maš-da3), ostriches (Sum. ga-nu11), and fallow deer (Akk. *ayyalu*), all appearing in fodder records at Ašnakkum and at Tuttul, accompanied by various types of wild fowl. The above sections suggest discrepancies in the textual documentation to relate first and foremost to managerial practices. I have pointed out some functional reasons for the more abundant information available on draught animals, e.g. plough and cart oxen, horses, hybrids, and donkeys, as opposed to breeding herds, which only appear in the managerial record under particular circumstances. These managerial preferences naturally limit conclusions as to the overall scale of livestock holdings and modes of livestock management.

The management of cattle, sheep and goat demonstrates mixed-purpose herding practices, with an emphasis on draught power (cattle) and wool production (sheep and goat) accompanied by lesser scale supplementary feeding for meat-production. I discuss draught oxen in more detail below, but if we take their number at each of the study sites as a proxy for the overall stock of cattle, then the total number available to an institutional household would number in the many hundreds, e.g. the c. 500 head accounted for in the Ašnakkum cattle inventories and presumably around 200-300 at Alalah, Šehnā and Šušarrā. The context of the 1,200 head grazing in the Balīkh north of Tuttul is less clear, but certainly a sensible figure when juxtaposed with the above numbers, and when accounting for the association of this herd with a much more extensive economic and political infrastructure (i.e. Mari). As stated earlier, numbers for sheep and goat are poorly documented in the dataset in general, but occasional attestations of rams and kids brought for slaughter or sacrifice provide for some rough impressions. The sacrifice of 70 sheep around harvest time by Iltani of Qaṭṭarā, and the receipt of more than 150 head of sheep and goat at the time of the *elunnu*-festival at Šehnā underscore the relative abundance of animals at hand, even if these are not consistently recorded in the administrative record. The scant references to transhumant movements of sheep and goat regularly run into the thousands of head, e.g. the 4,000 sheep driven to Šehnā for pasture, or the, rather elusive, note on 28,000 sheep from Karkamiš appearing at Alalah. The number of equids, namely donkeys, horses, and hybrids appears to be of a much smaller magnitude. Alongside its impressive cattle holdings, the donkey breeding pack at Ašnakkum is relatively modest in size, but the lower numbers may equally be due to an increased reliance on pasture or straw feeding, which would escape documentation contained in the present data set.

An important observation, the implications of which are discussed in more detail in the next chapter, concerns the number of draught oxen found at individual sites. We have seen that attestations of draught oxen in the dataset align within a surprisingly narrow range, generally counting some 30-50 head. Some of the numbers supplied in my discussion of cattle above are qualified approximations, e.g. for Alalah, but generally speaking, it is interesting to note the relatively close agreement of numbers from all of the study sites where data on draught oxen is available. Whether other types of draught animals were used, i.e. donkeys, is not clear from the present data set.

Turning to meat consumption, holdings of meat-producing livestock such as pig and fowl offer a quantitatively speaking interesting counterweight to the core triad of Bronze Age livestock, namely cattle, sheep, and goat. Again, managerial practice and modes of recording may obscure our view, but the number of pigs reared at Ašnakkum corresponds well with figures from the alluvium, and would have allowed for a substantial level of culling each year. My estimate for Alalah is lower, but the suggested drove of 40 head would still have been able to produce a hundred piglets annually, if using a low figure and assuming the number to represent fully grown animals. That piglets could be issued for individuals is borne out by the solitary reference to pigs found at Šušarrā. Fowl, equally, seems to be an industry of some significance, at least with regard to the flocks of geese found at Tuttul and Alalah. Fish appear only in a nucleated context, and may further be a product of long-distance exchange, but the less extensive documentation on this resource is likely also a consequence of storage and accounting practices. While pig rearing and fowling encompasses smaller numbers of animals than cattle, sheep and goat, the latter group had a range of other uses, meaning that pig and geese might have made a bigger impact on meat consumption patterns than their numbers relative to cattle, sheep and goat would imply. Having placed documentation on animal husbandry in a proper relation to the production, circulation, and consumption of agricultural products, let us turn to a discussion of overall organisational scale, where our discussion of draught power in particular will also prove useful.

9 Scaling political economies

In the preceding three chapters, I have presented and discussed the economic infrastructure of basic subsistence resources on a case-by-case basis, and pointed to principal patterns observable within the institutional household economy. The present chapter draws together key variables with the aim of estimating the overall size of institutional households in a comparative perspective. Specifically, I consider here the scale, in material terms, of the institutional household economy relative to, first, its parent settlement and, second, the associated micro-region.

I use cereal consumption as a common denominator, meaning the amount of cereals consumed by a person or an organisation within a given time period. I discussed the relevant variables relating to settlement and micro-region in Chapter 4. When assessing the consumption needs of a given settlement or group of settlements, I operate with an estimated population density of 100-200 persons/ha. For each individual, I assume an annual rate of cereal consumption at 375 kg/person. Approaches to quantitative data relating to the institutional household economy at each of the study sites will be discussed under the relevant headings below. We have already seen that cereals are, by far, the most abundant single resource type appearing in the dataset (6.5 and 7.2.1), and so the balance of examples presented here are concerned with the scale of cereal production and consumption only. A few other proxies will also be utilised, however, first tilling rate, which can be calculated from the number of draught oxen maintained by institutional household organisations, and second attestations of agricultural land.

9.1 The grain economy

In considering the grain economy, I maintain two basic perspectives; the scale of *production* and the scale of *consumption* of cereal resources. Both can be established through a consideration of administrative documentation relating to, respectively, the receipt and the disbursement of cereals. In the following, I point out and discuss examples from among the study sites where the documentation allows for the reconstruction of annual levels of cereal production or consumption within the political economy. I begin with dossiers from Ašnakkum and Alalah, where we find extensive documentation on cereal disbursements, followed by a more diverse set of records from Tuttul, Šušarrā, and Qaṭṭarā that can be related to the receipt of cereals from agricultural production. I subsequently discuss the overall validity of the figures emerging from these cases, and how they may be related to other historical examples available in scholarly literature.

9.2 Assessing consumption levels

Calculating an annual level of cereal consumption within the institutional household economy is essentially a question of defining and isolating a body of documentation that we would expect to be representative of the pertinent economic infrastructure as a whole. In the case of cereal consumption, we will base our analyses on allotments to humans and fodder to animals. As grain was typically allotted on a monthly basis, our aim should be to define, with a satisfactory degree of coherency, the amount of grain allotted from institutional household storages for a month's duration. The total number, with qualifications, may then be used as a basis for calculating annual consumption figures.

9.2.1 Ašnakkum: the scale of cereal consumption

From Ašnakkum, let us consider two analytical groups relating to grain allotments to household dependants (ASZ Sample 1) and grain fodder to livestock holdings (ASZ Sample 2). These groups are derived from series contained in the grain disbursement dossier (ASZ Dossier 2) from Room TD 106, comprising a total of 56 complete and damaged records relating to recurring disbursements of grain. The chart below (Figure 9.56) orders amounts of grain contained in 34 texts from this dossier that holds a date. Drawing together typical records from each series contained in this dossier giving the highest aggregate amount, we can then establish an overall monthly estimate of institutional grain consumption. The sample set combines seven texts relating to personnel (namely ASZ Series 5-10 and 17), and another six for livestock (ASZ Series 11-15 and 18). The overall numbers that we can glean from this text sample are summarised in the table below (Table 9.52).

In total, these samples relate cereals for c. 550 individuals and c. 225 head of livestock of all sorts. Rates for livestock should be considered in light of observations on accounting practices discussed earlier (8.10). The composition of this sample merits a couple of brief comments. I have left out a group of 32 plough oxen accounted for in a fodder record from the fattening house (OBTCB 30), as these do not appear later in the winter next to the larger group of 50 oxen included here. Inhabitants of Zikku, presumably a small hamlet in the vicinity of Ašnakkum, affirmatively does not appear throughout the series of workshop allotment records (and thus is not receiving grain throughout the year), but we cannot say for how many months grain is issued to the 46 people recorded here, and so this segment is maintained for a full year in the current table. Allotments for weavers and fullers listed in OBTCB 85 have likewise been calculated for an entire year because of the multiple examples of monthly disbursments to this group found in the dossier, but the upkeep for such a large group of textile workers throughout a full twelve months seems otherwise excessive when considered against the remainder of the managerial infrastructure. Fodder expenses for livestock are likely too high, considering increased availability of pasture or straw at certain points in the year, e.g. for equids. The annual total gleaned from these analytical groups lands then at close to 310 tonnes of cereals, of which 38.7% was issued for livestock. Lastly, we may factor in expenses for the palace brewers (OBTCB 13, cf. 6.7.6), which would add another 57,300 *qa*, or close to 45 tonnes of cereals.

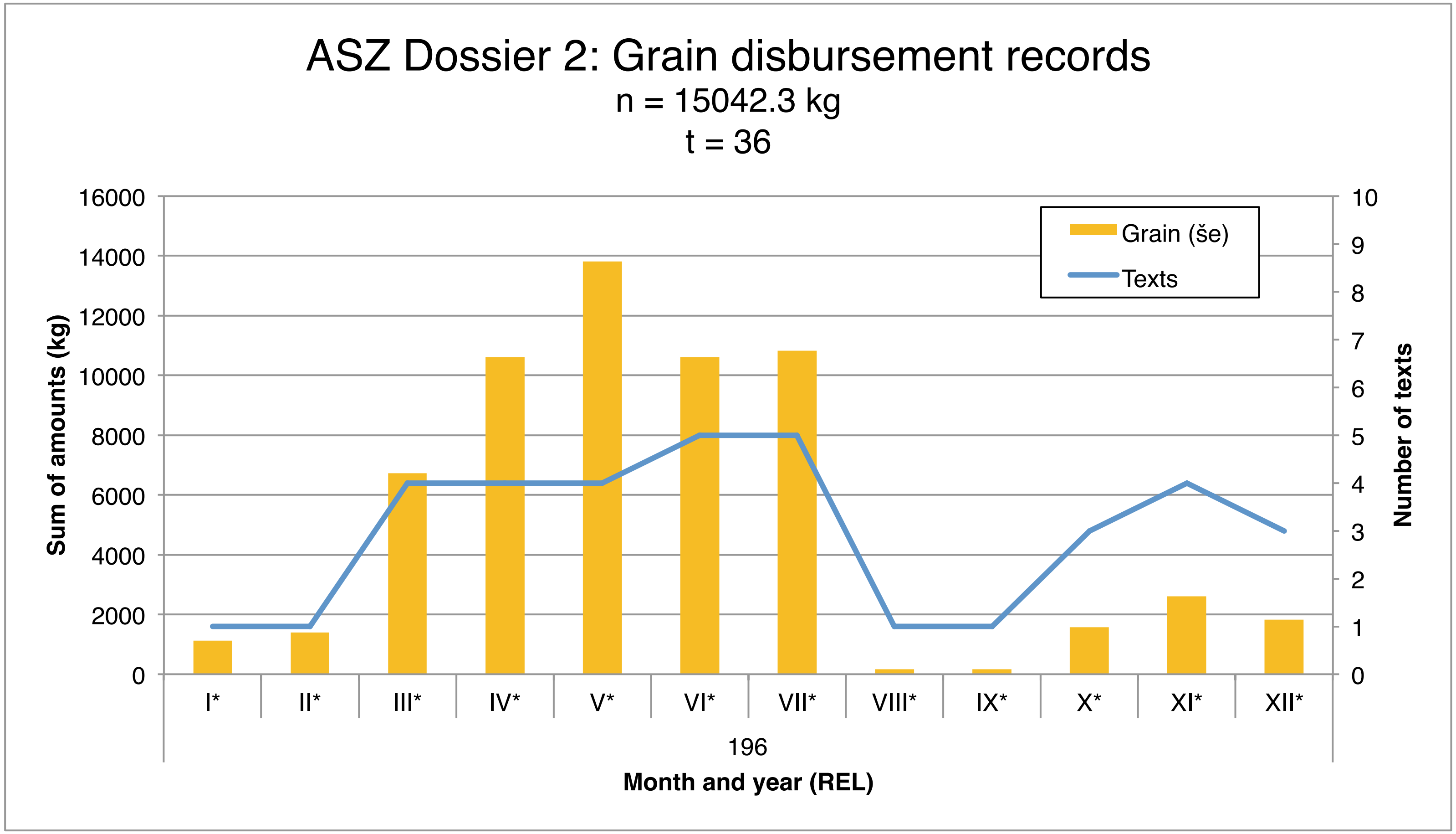


Figure 9.56: Sum of amounts (columns) in dated texts (line) by month in REL 196 (qa/litre ratio of 1:1.2)

Sample	Major ID	Detail Data Source	Description	Series	Month (*qa*)	Month (kg)	Year (kg)
ASZ Sample 1	ASZ_1_0_0	OBTCB 12	Workshops and craftsmen	ASZ Series 5	5,620	4,383.6	52,603.2
	ASZ_69_0_0	OBTCB 80	Palace residents and personnel	ASZ Series 6	2.140	1,669.2	20,030
	ASZ_67_0_0	OBTCB 78	House of Šubat-Enlil	ASZ Series 7	1,790	1,396.2	16,754.4
	ASZ_55_0_0	OBTCB 66	Agricultural managers	ASZ Series 8	520	405.6	4,867.2
	ASZ_40_0_0	OBTCB 51	Herders	ASZ Series 9	210	163.8	1,965.6
	ASZ_74_0_0	OBTCB 85	Weavers and fullers	ASZ Series 10	9,740	7,597.2	91,166.4
	ASZ_50_0_0	OBTCB 61	Grooms	ASZ Series 17	200	156	1,872
ASZ Sample 2	ASZ_49_0_0	OBTCB 60	Plough oxen	ASZ Series 11	4,500	3,510	*21,060
	ASZ_19_0_0	OBTCB 30	Fattening house	ASZ Series 12	1,380	1,076.4	12,916.8
	ASZ_43_0_0	OBTCB 54	Pigs	ASZ Series 13	3,150	2,457	29,484
	ASZ_5_0_0	OBTCB 16	Pack donkeys	ASZ Series 14	420	327.6	3,931.2
	ASZ_61_0_0	OBTCB 72	Equids	ASZ Series 15	5,250	4,095	49,140
	ASZ_47_0_0	OBTCB 58	Birds and gazelles	ASZ Series 18	305	237.9	2,854.8
					35,225	**27,475.5**	**308,646**

Table 9.52: Aggregate amount of cereals contained in ASZ Sample 1 and 2
(utilising a *qa*/litre ratio of 1.2, with * indicating maintenance for six months only)

9.2.1.1 Ašnakkum: settlement and micro-region

The established micro-region for Ašnakkum is constituted by the area encompassed within an arbitrary radius of 15 kilometres from the settlement. The basis of the very partial settlement record within this zone for the Middle Bronze Age is described in more detail in the site biography (14.2). The administrative records from Ašnakkum itself mention a few rural settlements presumably close to the town, e.g. Zikku, mentioned above (see OBTCB 12 and 88), and, in a more nebulous context, Zibal, the home of ten men who on one occasion bring grain to Ašnakkum (OBTCB 8). More extensively documented is Til-šannum, a locale appearing as a centre for cattle rearing (in the livestock inventories OBTCB 68, 69, and 76. On these, see 8.1.3). Other toponyms appearing in the dataset are either neighbouring principal settlements, such as Urkiš, Kahat, or Ṭabatum, or political centres further afield, e.g. Šubat-Enlil, Aleppo, Qaṭna, and Ekallatum. Amaz, some ten kilometres due east, does not figure in local texts, but excavations and sources from elsewhere indicate the site to have been occupied during the 18th century BCE (see 14.2).

At 7 ha, the gross subsistence needs of the entire human population of Ašnakkum amounts to an overall 262.5 to 525 tonnes of grain annually, when using population density figures and annual consumption per person given above. When expanding population numbers to include attested settlements within the designated micro-region, we arrive at 999 to 1,998 tonnes of grain per year for an aggregate 26.64 ha divided between 12 sites (Figure 9.57). Against these numbers we may now consider the gross product of the institutional household, as derived from ASZ Sample 1 and 2 summarised above. The 355 tonnes of cereals projected for the institutional household equals 68% to 135% of the annual subsistence needs of the town of Ašnakkum alone. Turning to the relative scale of the institutional household versus the associated micro-region, the institutional household accounts for 18% to 35.5% of micro-regional subsistence needs. It should be recalled here that the derived numbers for the micro-region are based on a very patchy survey record, and that the addition of further settlements through more intensive survey would lower the overall percentage constituted by the institutional household economy.

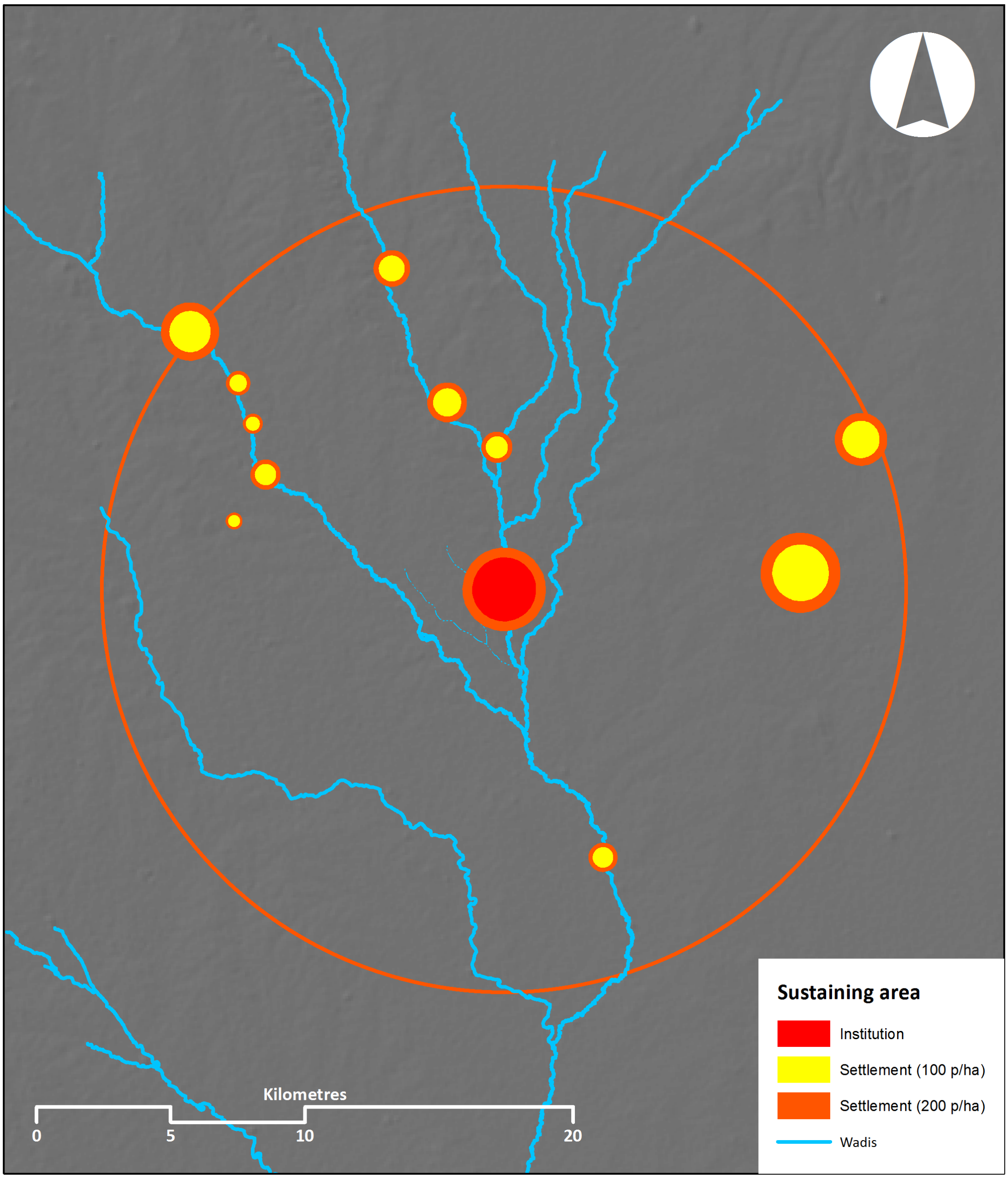


Figure 9.57: Settlement sustaining areas within the Ašnakkum micro-region (700 kg/ha)

9.2.2 Alalah: the scale of cereal consumption

The general number and composition of household personnel at Ašnakkum mirror patterns emerging from Alalah. Records of monthly disbursements of barley, emmer, and vetch at Alalah derive from the palace storage rooms and number a total 28 individual texts (discussed in Zeeb 2001, with the addition of ATaB 43.04 published in Dietrich and Loretz 2006, 115-116). The records differ in format from the Ašnakkum grain disbursements, first in that they maintain less rigid divisions between different resource types (each record habitually covers issues of barley, emmer, and vetch), second in that entries are made primarily with reference to groups of recipients, rather than individuals. The overall information that we are able to extrapolate with regard to the characteristics of individual recipients is then coarser than seen in the former case of Ašnakkum, yet several parallels can be established with regard to managerial segments within the economic infrastructure.

Zeeb has discussed the present dossier in much detail, and the present discussion merely points out some principal patterns emerging from the record. Three major groups appear with noticeable regularity. The first is a group variably referred to simply as women (Sum. munus), but also as female servants (Sum. geme$_2$) (see Zeeb 2001, 218-233 for an exhaustive discussion). Assuming one *parīsu* to be the standard monthly allotment for an adult, the issued amount suggests a group of 60 to 75 women. The second are the weavers (Sum. uš-bar), apparently all males, and numbering between 12 and 20 men, with 17 on average (Zeeb 2001, 245-253). The third are a group of male workers or captives (Akk. *asīru*), counting between 7 and 30 and on average around 12 individuals (Zeeb 2001, 233-245). Summing up these numbers, a core personnel group of some 100 individuals were evidently in regular receipt of grain allotments, though the records offer less consistent information on many more. We can add further to this, though the lesser degree of document standardisation seen at Alalah often complicates interpretation. Groups of draught oxen are maintained and overseen by estate (Sum. e$_2$-uš) and agricultural managers (Sum. engar) (Zeeb 2001, 287-313). A fowler (Sum. mušen-du$_3$) appears many times, also as the recipient of fodder for birds (Zeeb 2001, 265-267). Equids, namely donkeys and horses, appear regularly, at the hands of several named supervisors (Zeeb 2001, 323-404). Pigs, equally, are issued fodder explicitly on one occasion, and via a herder (Sum. sipa) on several others (Zeeb 2001, 381-383). Though considerably less formalised, the assemblage maintains then several managerial segments comparable to those found at Ašnakkum, both with regards to the number and composition of personnel and livestock. Figure 9.58 below orders texts contained in ALA Dossier 1 according to the chronological sequence established by Zeeb (2001, 158-183). This includes eight disbursement records from year A (ALA Series 1), 12 from year B (ALA Series 2), and eight from year C (ALA Series 3). As can be seen, the series maintains a fairly constant ratio between barley, emmer, and vetch (as seen earlier, cf. 7.2.1.4).

With a total twelve monthly disbursement records, the reconstructed sequence for Year B should, logically, give us an approximate figure for annual consumption. In order to account for sample incoherency, we can approximate overall consumption levels by establishing a mean monthly value. We can do this through a calculation from the 19 complete and fairly complete documents contained in ALA Dossier 1 (Figure 9.59). The total of amounts included in this selection account for more than 80% of all amounts contained in ALA Dossier 1. Adding together mean monthly values given in the table below, we arrive at c. 115 tonnes of cereals annually (I exclude the numbers on vetch from the calculations, given its more specific area of use).

Detail Data Type	Month (kg)	Year (kg)
Barley (Sum. še)	6,532.09	78,385.07
Emmer (Sum. ziz2)	2,905.86	34,870.32
Vetch (Sum. zi-aš)	1,198.14	14,377.63
	10,636.09	**127,633.02**

Table 9.53: ALA Dossier 1: Average amount of cereals and vetches in disbursement records

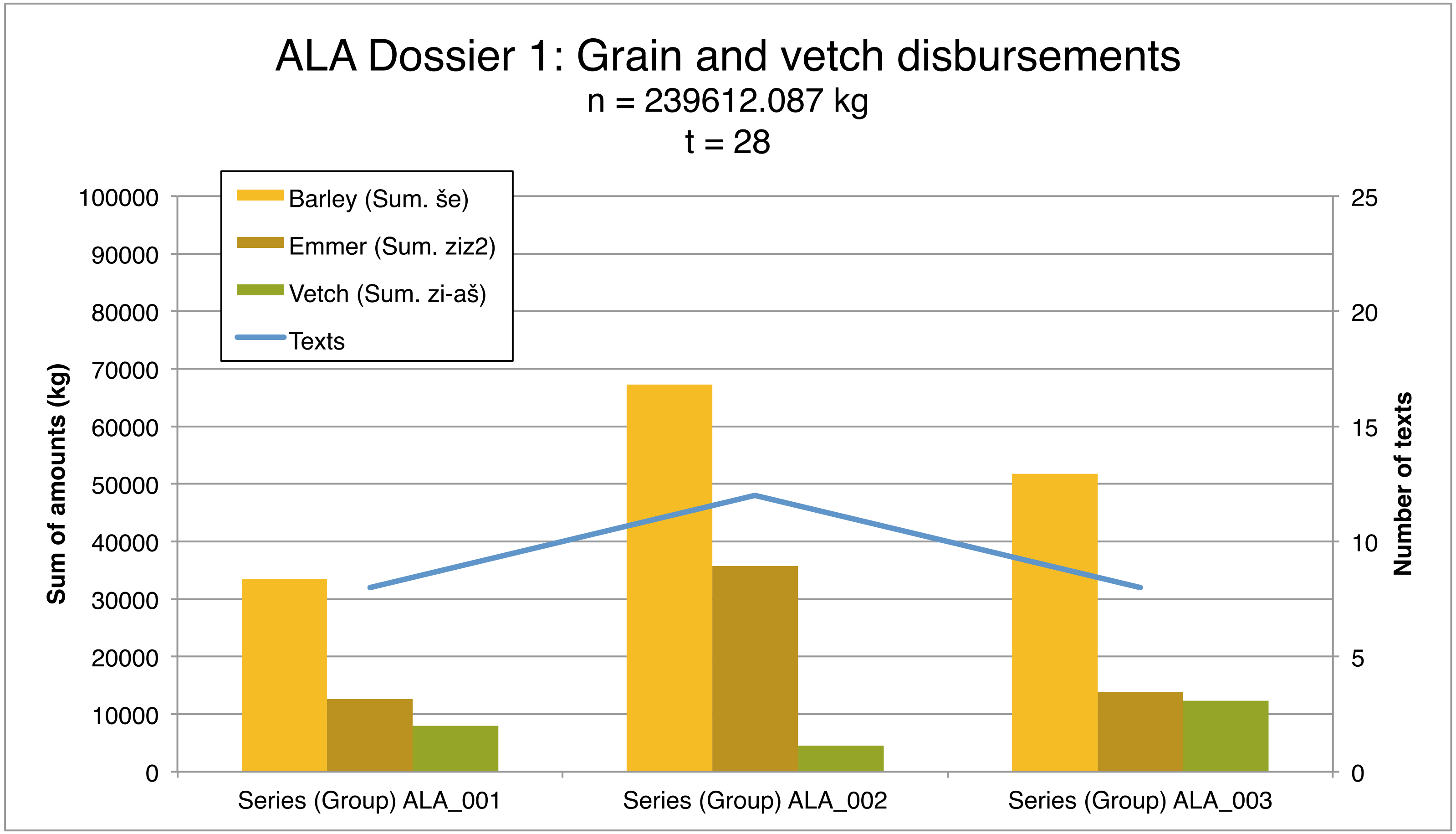


Figure 9.58: ALA Dossier 1: Sum of amounts (columns) in dated texts (line) by year series (qa/litre ratio of 1:1)

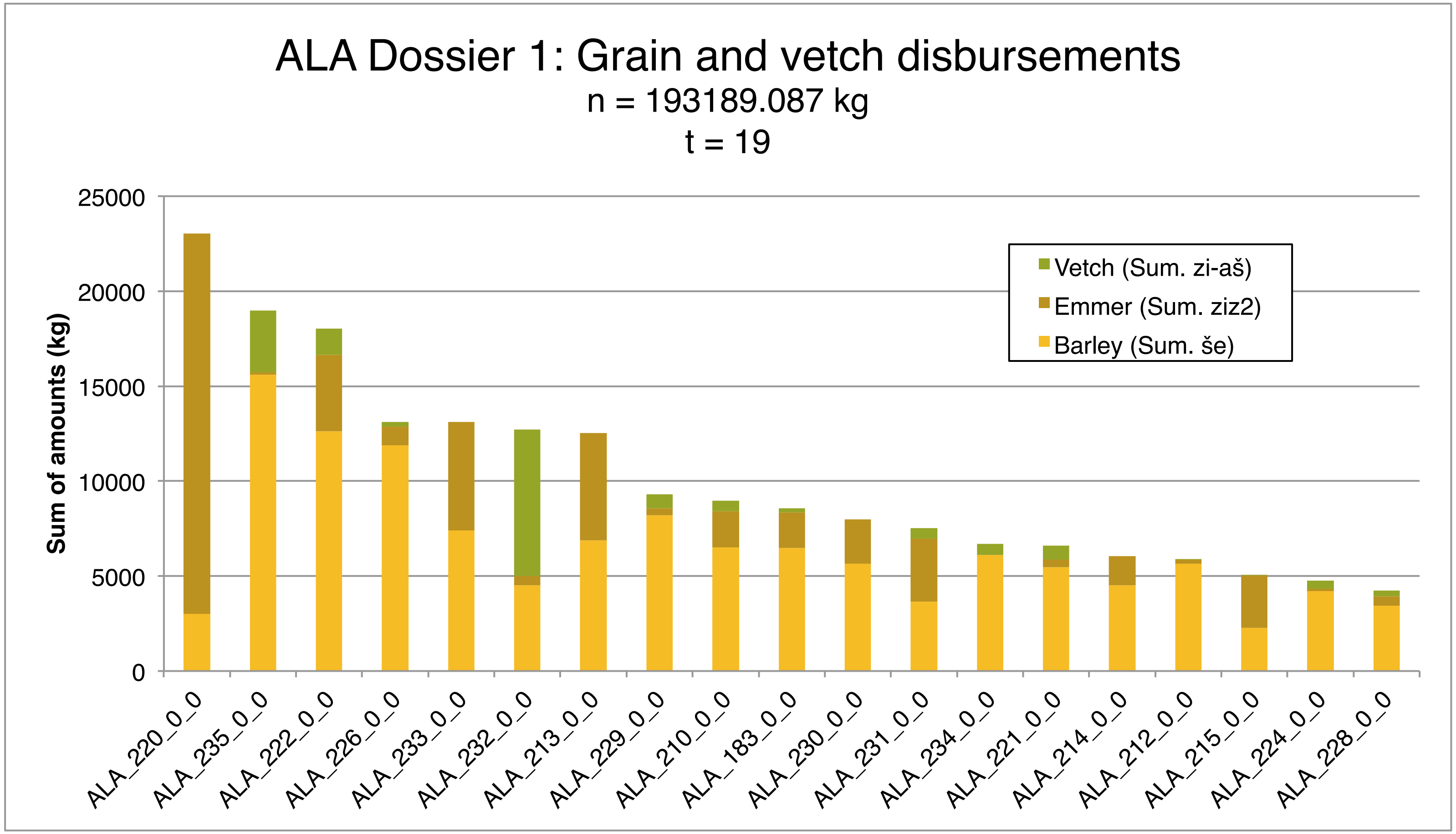


Figure 9.59: ALA Dossier 1: Sum of amounts (columns) in Complete and Fairly Complete texts (qa/litre ratio of 1:1)

9.2.2.1 Alalah: settlement and micro-region

The micro-region defined for Alalah encompasses most of the valley floor of the Amuq, abiding by the generally observed settlement hierarchy that places Alalah (and neighbouring Tall Tayinat) at the head of a three-tier settlement hierarchy (see 12.2). At 19 ha, Alalah itself would have had a population of 1,900-3,800 people, with a projected annual consumption rate of 712.5-1,425 tonnes of cereals (Figure 9.60). The scale of institutional grain consumption equals some 12% to 16% of this amount. Including 70 sites of a total 153.135 ha, the associated micro-region produces an estimated aggregate population of 15,313.5-30,627 people. This gives an annual rate of cereal consumption of 5,743-11,485 tonnes. In comparison, the institutional household accounts for a mere 1-2% of this amount.

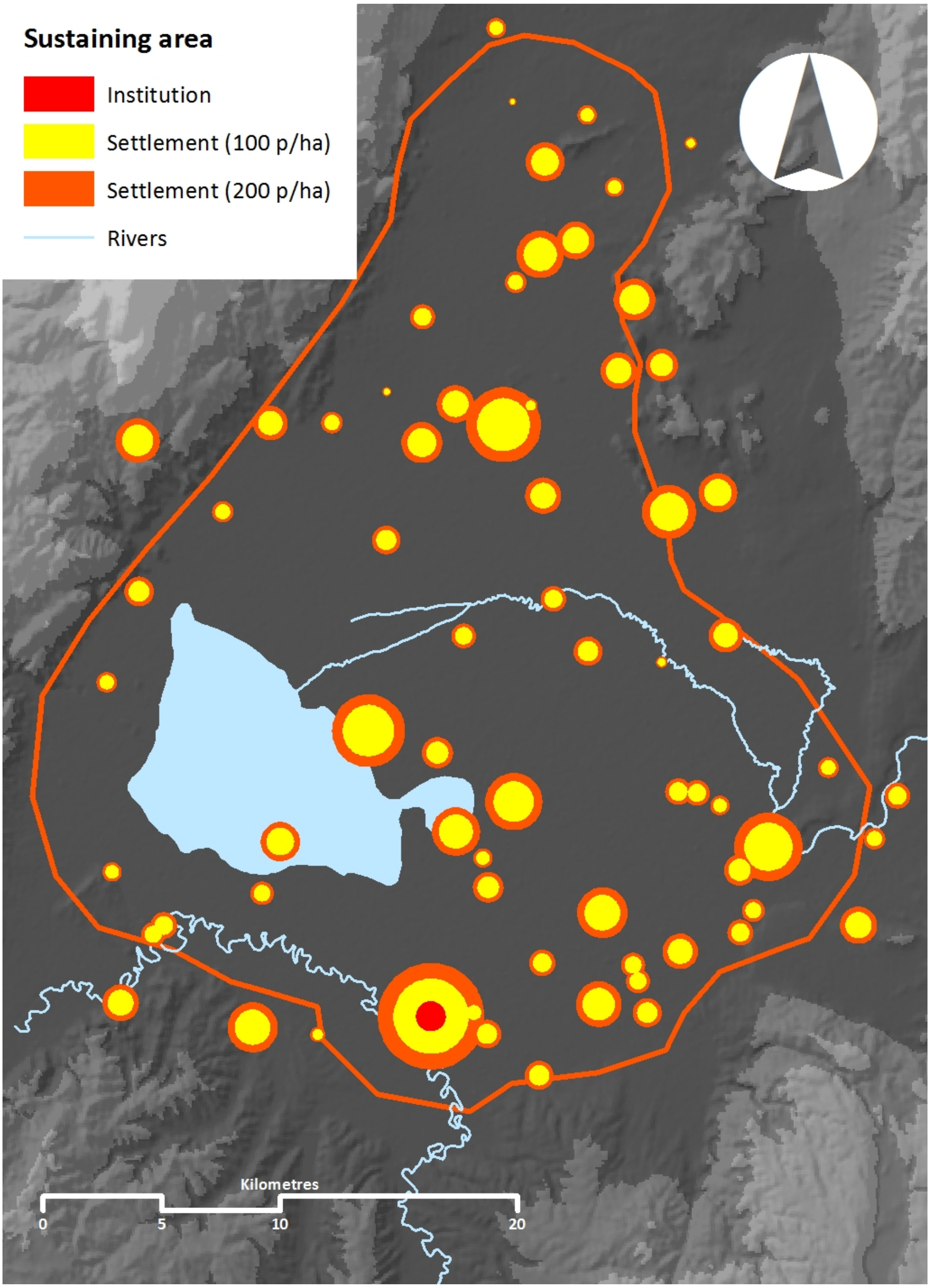


Figure 9.60: Settlement sustaining areas within the Alalah micro-region (900 kg/ha)

9.3 Assessing production levels

A further set of qualifications comes into play when turning to cereal *production*. Data on harvest yields may or may not include sowing seed for the next agricultural cycle or excess cereal eventually fed to livestock in order to preserve nutrients. Consequently, the examples listed below may be subject to a wider selection of qualifications than those given above, but their comparative alignment with the two prior examples, as discussed later, is of some interest. Comparable studies suggest that available yields from cereal production should account for 10-25% of the total as used for sowing seed or lost to spoilage (e.g. discussion by Paulette 2015, 49-53), and the above discussion of annual consumption at Ašnakkum indicates that livestock could also take up a substantial part. While the latter variable is not critical to the numbers presented below, the former should be kept in mind when approaching figures derived from texts on cereal production.

9.3.1 Tuttul: the scale of agricultural production

In KTT 120, we have a presumably full account of agricultural yields generated by institutional plough teams working land in the lower Balīkh valley and in the Euphrates around Tuttul in the year of Adad-bānī (REL 196). In all, the text accounts for more than 1,000 tonnes of grain. Cereals received are divided into deliveries from three agricultural managers (Sum. engar) and derived from five specific threshing floors. The basis for assuming KTT 120 to be an account of the total annual output of cereals emerges from the interrelation of managers and threshing floors. The contributions of all three agricultural managers derive in part from the same locations, i.e. the threshing floor of Ṣerdā. The format of the document then does not seem to record a transaction confined to one agricultural manager or one threshing floor alone, which would suggest the record to include all plough teams and all threshing floors involved in institutional agricultural production. To substantiate this assertion, it should be noted that all contemporary documents from Tuttul make reference only to the three agricultural managers appearing here (Krebernik 2001, 195-196).

Dividing the amount of cereals received according to geography, a total of 305 tonnes came out of Ṣerdā, of which 93.6 tonnes were retained for sowing seed (Sum. numun). We assume that the remaining four threshing floors accounted for in the text were associated with Tuttul, and so arrive at a total 774.598 tonnes for the latter locale (Figure 9.62). Roughly a third of the gross total, namely 325.459 tonnes, was allotted to storage (Akk. *našpāku*), palace grain rations, or named institutional managers. No specific destination or purpose is given for the remaining two-thirds of the total. Including all grain except amounts retained for seeds and compensation for the unintended grazing of a field, we get 984.26 tonnes (Figure 9.61).

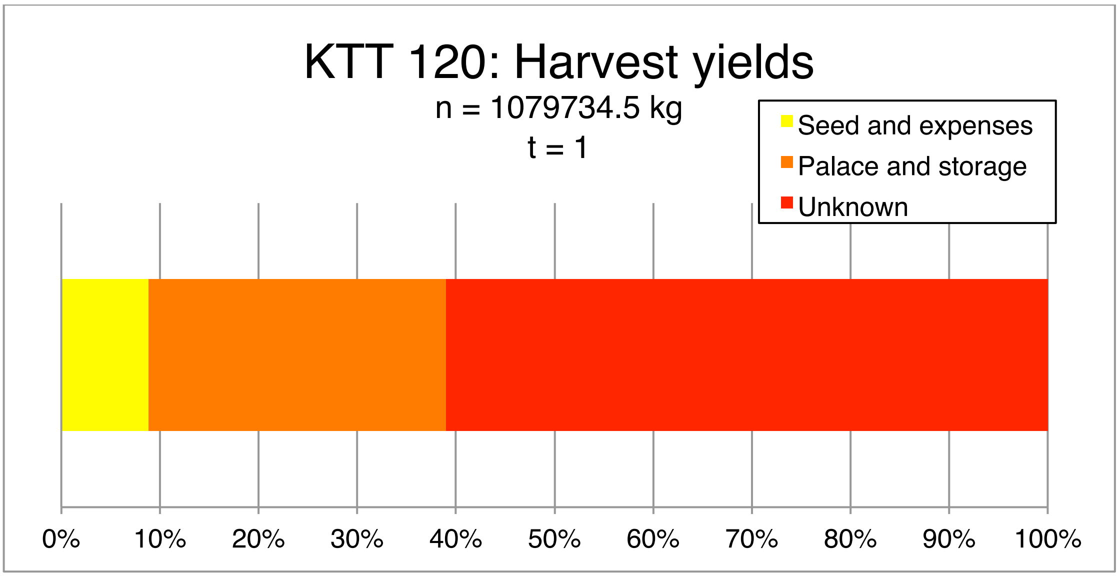


Figure 9.61: Sum of amounts in KTT 120 divided according to general recipient (*qa*/litre ratio of 1:1.2)

9.3.1.1 Tuttul: settlement and micro-region

The micro-region defined for Tuttul diverges from the remainder of the case studies presented here given the particular signature landscape comprised by the valley troughs of the Balīkh and the Euphrates and adjoining plains. Situated within an area receiving an annual average of 200-225 mm of precipitation, I have demarcated here a micro-region according to topographical features, with region outlines following the valley floor at a distance of up to 15 kilometres from Tuttul itself, but including the southern part of the Balīkh valley up to a point some ten kilometres north of Ṣerdā (Tall al-Samān). The particulars of the historical geography and the reasoning for this analytical outline are given in the appendices (see 13.2). In other words, the micro-region is then extended to accommodate for the fact that the institutional household at Tuttul formed the nave of an agricultural infrastructure that extended as far as the Samān Plain. As with Ašnakkum, the settlement pattern generated for the Tuttul micro-region is only partial in coverage.

First, let us consider the relative scale of institutional household cereal output against subsistence needs of the entire settlement of Tuttul. With an estimated settlement extent of 38 ha during the Middle Bronze Age, we calculate a population of 3,800-7,600 people and an annual consumption rate of 1,425-2,850 tonnes of cereals. The total amount of cereals in KTT 120 available for consumption constitutes 34.54 to 69.07% of this amount. The micro-region includes 17 sites accounting for a total 70.168 ha. The overall consumption figure arrives at a range of 2,631-5,263 tonnes of cereals (Figure 9.63), compared to which figures derived from KTT 120 constitutes 18.7 to 37.41%. These percentages utilise the higher figure derived from KTT 120. If using only the c. 325 tonnes explicitly allotted to the institutional household and storages, the percentage of overall site consumption drops to 11.4-22.8%, and 6.2-12.4% of the micro-region total.

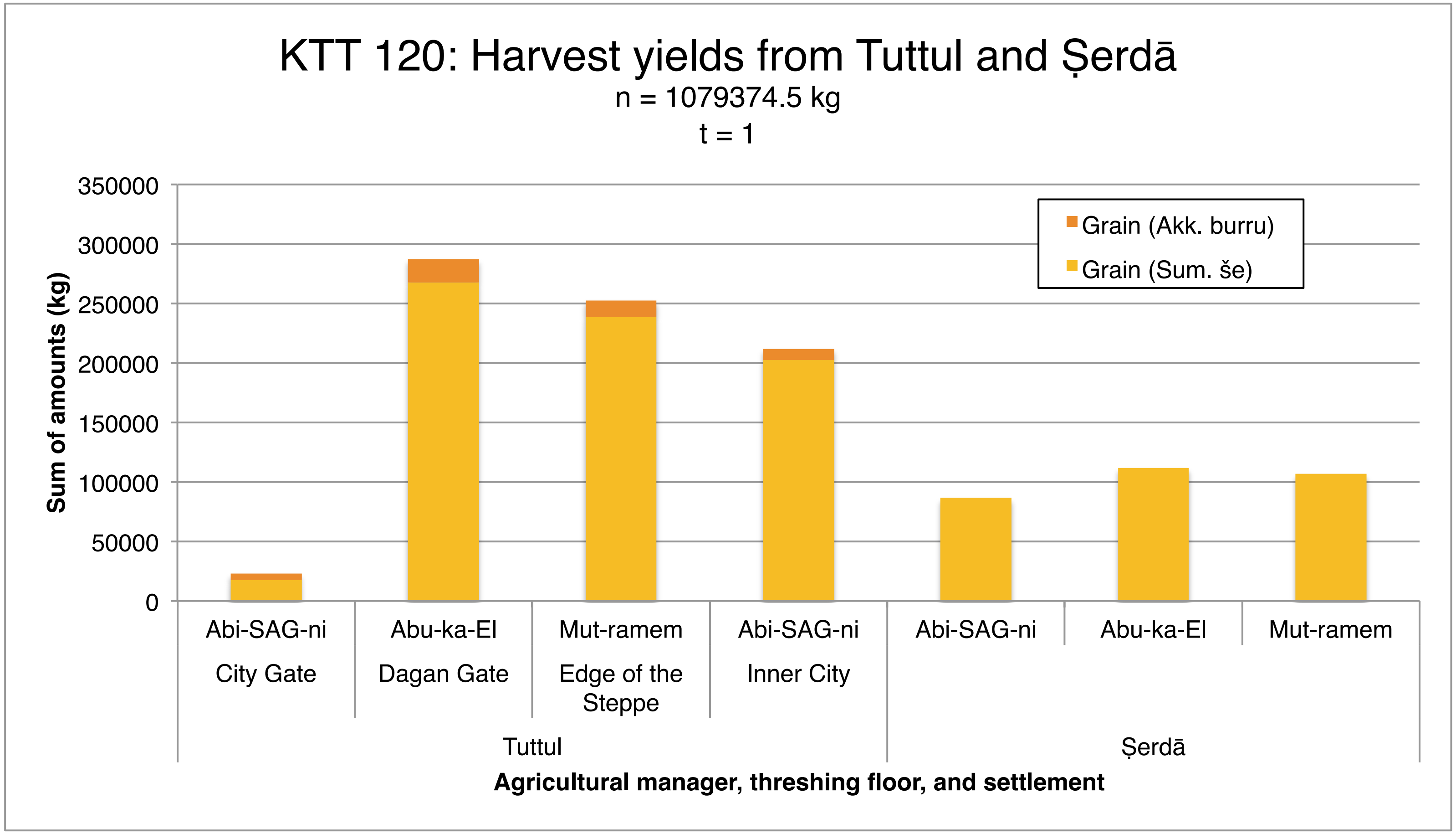


Figure 9.62: Aggregate amount of cereals recorded in KTT 120 (TUT_120_0_0)

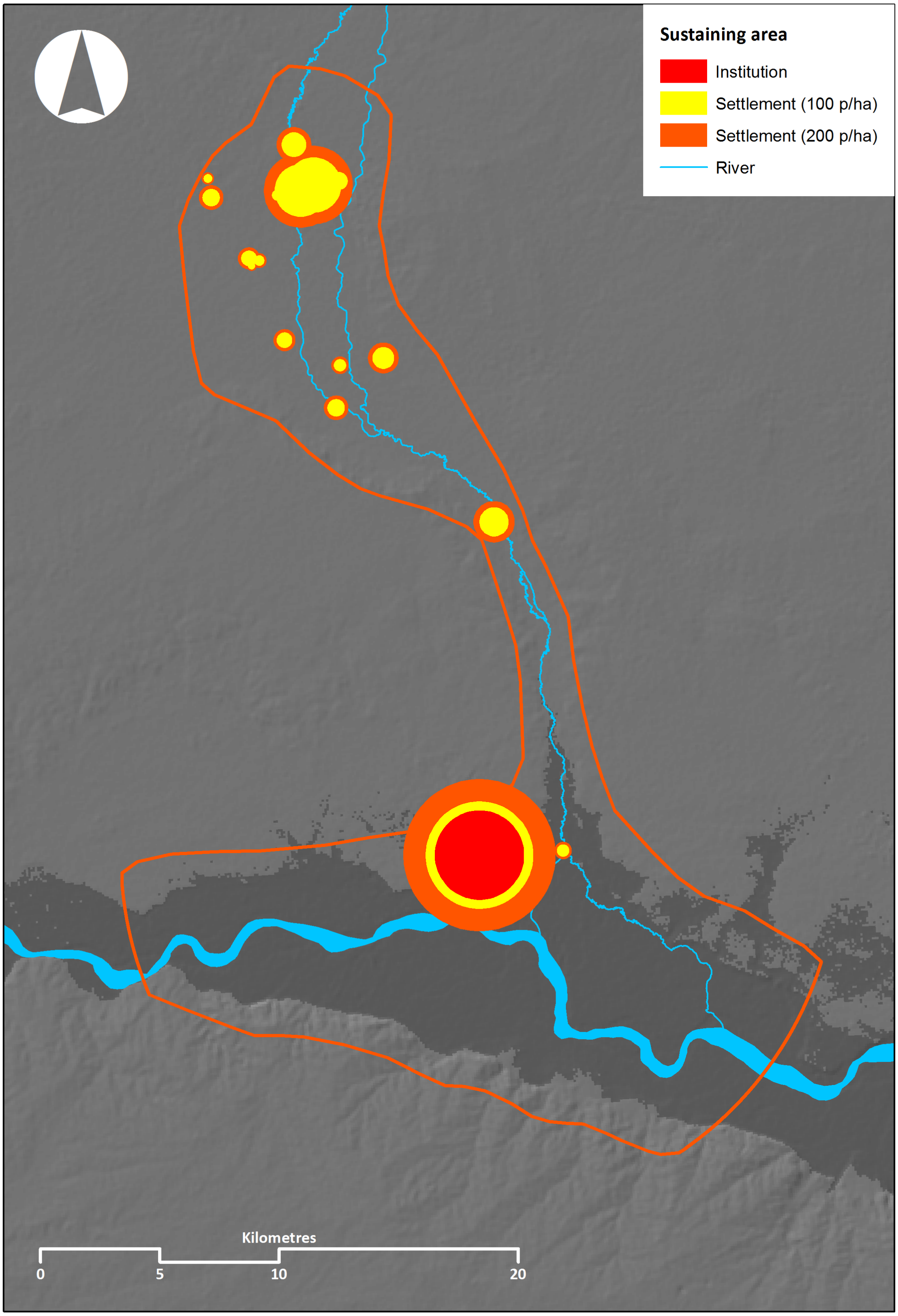


Figure 9.63: Settlement sustaining areas within the Tuttul micro-region (900 kg/ha). Institutional scale projected from an annual consumption of 984 tonnes.

9.3.2 Šušarrā: the scale of agricultural production

Turning to Šušarrā, I have briefly reviewed the basis for using SZU Dossier 1 as a measure of annual agricultural production (7.2.1.4). While we lack an explicit chronological framework for this dossier, the archaeological context suggests the administrative documentation to be confined within a window of two years and perhaps less, and while rather terse in format, the set of harvest accounts demonstrates no clear overlap in terms of producing locales or resource type. Figure 9.64 below collects aggregate amounts and resource types contained in the series, giving us a relatively modest total of just over 115 tonnes of cereals and legumes, composed mainly of emmer, barley, and free-threshing wheat, along with lentil, pea, and vetch. Figure 9.65 on the following page excludes the relatively insignificant amount of groats and flour, and then divides out cereals and legumes according to the settlement from which they originated. This gives us a total of just below 115 tonnes. Leaving out legumes, this figure is reduced to c. 105 tonnes.

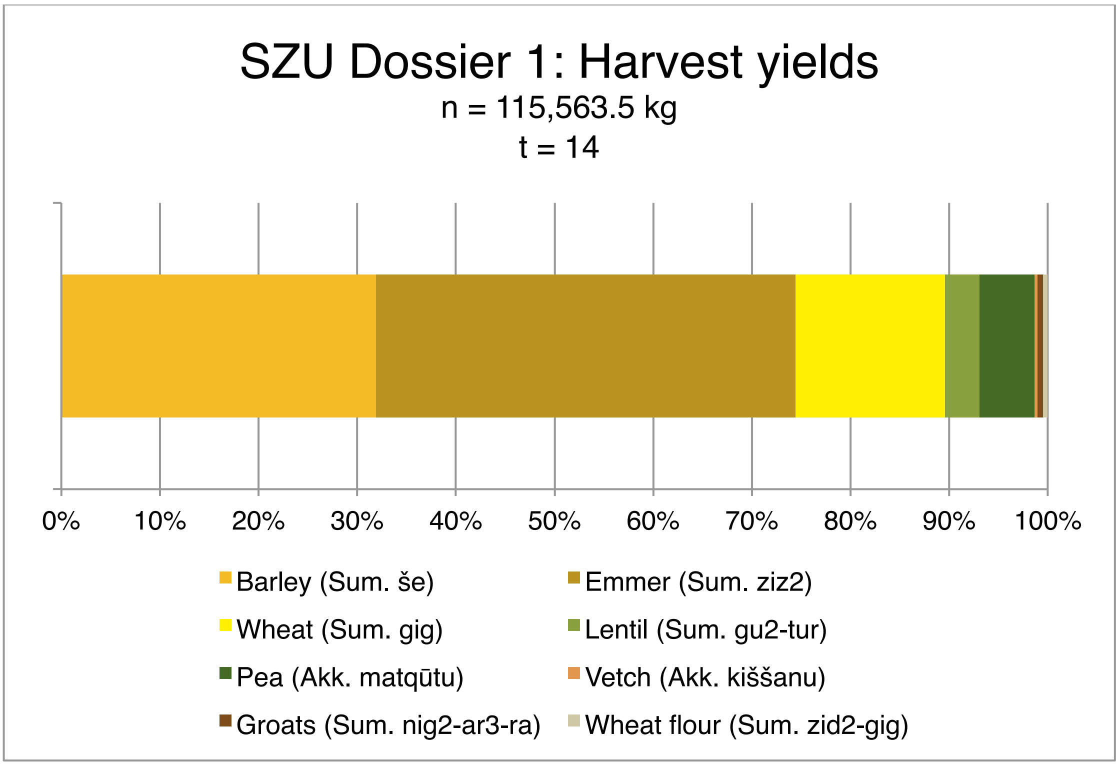


Figure 9.64: SZU Dossier 1: Proportion of amounts of resource types (*qa*/litre ratio of 1:1)

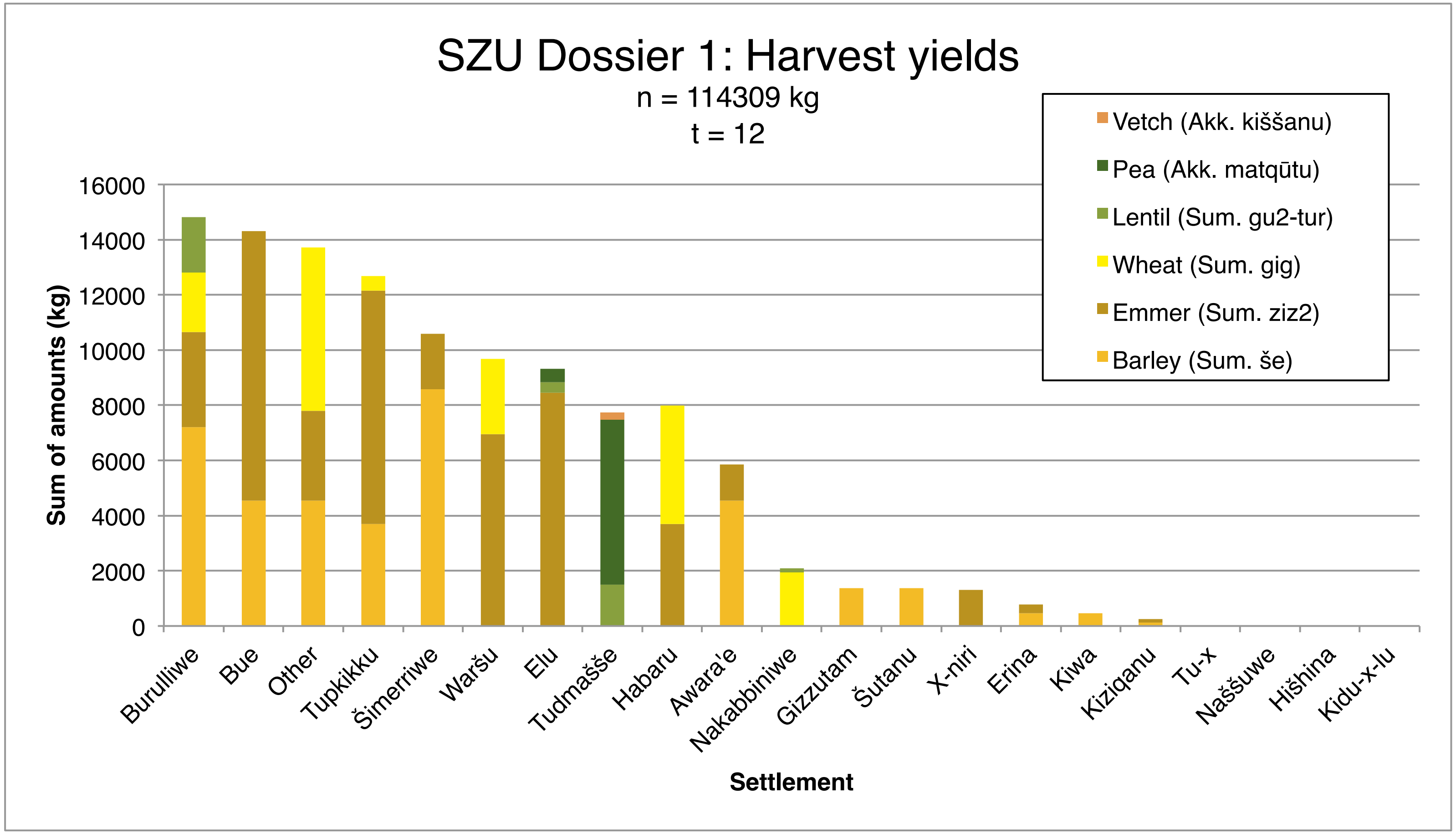


Figure 9.65: SZU Dossier 1: Sum of amounts (columns) of cereals and legumes by settlement of origin (*qa*/litre ratio of 1:1)

9.3.2.1 Šušarrā: settlement and micro-region

Let us assume that the 105 tonnes of cereals preserved in this dossier can be meaningfully related to the Šušarrā micro-region. I have explained the basis for giving the extent of Middle Bronze Age Šušarrā as c. 10 ha in the appendices (see 17.1). Using this figure gives us a settlement population ranging from 1,000-2,000 persons with an annual consumption rate of 375 to 750 tonnes of cereals, against which the institutional economy constitutes c. 14-28%. The micro-region defined for Šušarrā extends over the plains of Rānīah and Pišdar to the southwest and northeast of the town respectively. Available survey data includes 26 sites with an aggregate 46.58 ha, but covers in fact only the lowermost part of the valley floor now inundated by the Dūkan Lake. These settlements account for an estimated population of 4,658-9,317 persons, with an overall consumption rate of 1,746.86 to 3,493.71 tonnes of cereals (Figure 9.66). Our 105 tonnes estimate of institutional cereal production amounts to 3-6% of this amount.

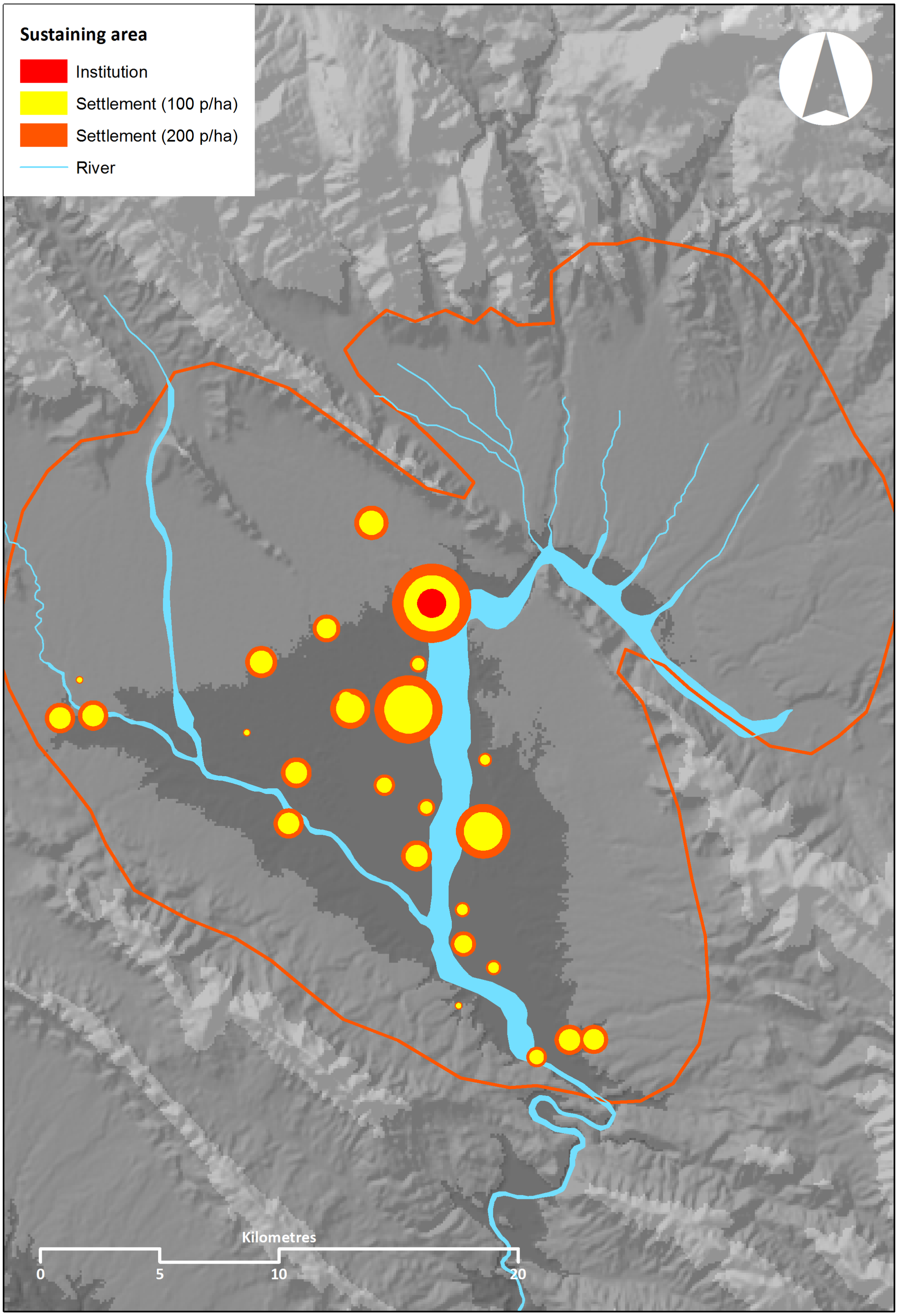


Figure 9.66: Settlement sustaining areas within the Šušarrā micro-region (900 kg/ha)

9.3.3 Qaṭṭarā: the scale of agricultural production

There are no extensive administrative assemblages relating to the management of cereals neither from Šehnā nor Qaṭṭarā. I include calculations on plough oxen at the former site in our discussion of tillage capacity (9.3). For the latter site, let us consider OBTR 322, an inventory of field plots from Qaṭṭarā and three associated settlements deriving from a late context close to the temple precinct (16.3.2). It is important to note that this text is not contemporary with, nor archaeologically related to, the archives of Iltani or the Middle Bronze Age palace complex in the lower part of the settlement (discussed e.g. in relation to beer, see 6.7.4). The text is a large, six-columned list with extensive breaks, and could tentatively have held up to 300 individual entries. The preserved fragments contain remains of 204 entries, of which an area extent can be established for 150. Each entry lists a quantity of grain, a corresponding field plot, and a name of an individual. Groups of field plots are ordered under headings relating to settlements, four of which are preserved. The purpose of the inventory is not entirely clear. There is a relative agreement between the amount of grain and the size of the field plot listed in individual entries, namely 10 *qa* per 1 *iku*. Assuming a disbursement of sowing seed to tenant plots, the implied sowing rate of c. 18 kg/ha is rather low in comparison with examples discussed earlier (when using a *qa*/litre conversion ratio of 1:1). More generally, it is not clear how these field plots relate managerially to an institutional household at Qaṭṭarā itself. With these reservations in mind, let us consider the numbers. I use our earlier conversion rate for dry-farming agriculture, namely a yield of 700 kg/ha, to calculate the amount of grain that could have been produced from these agricultural holdings annually. Assuming one *ikû* to correspond to c. 3,600 m^2, the total 969 *ikû* found in preserved field plots in OBTR 322 adds up to 348.84 ha, in turn translating into 244.188 tonnes of barley produced annually. These split between the four settlement sections as illustrated in the graph below (Figure 9.67). As the reverse of the tablet is extensively damaged, field plots assigned to the locality X-rum may relate to several individual settlements, and should therefore be approached with caution. In order to get closer to the original aggregate total, we can also take the average field plot size of 6.46 *ikû* emerging from the 150 preserved values (Figure 9.68), and multiply this number with 300 expected lines of entries, taking us to 1,938 *ikû*, 697.679 ha, or 488.375 tonnes of barley per year. These calculations, it should be noted, ignore limiting factors, particularly upkeep of field tenants, sowing seed, and fallow.

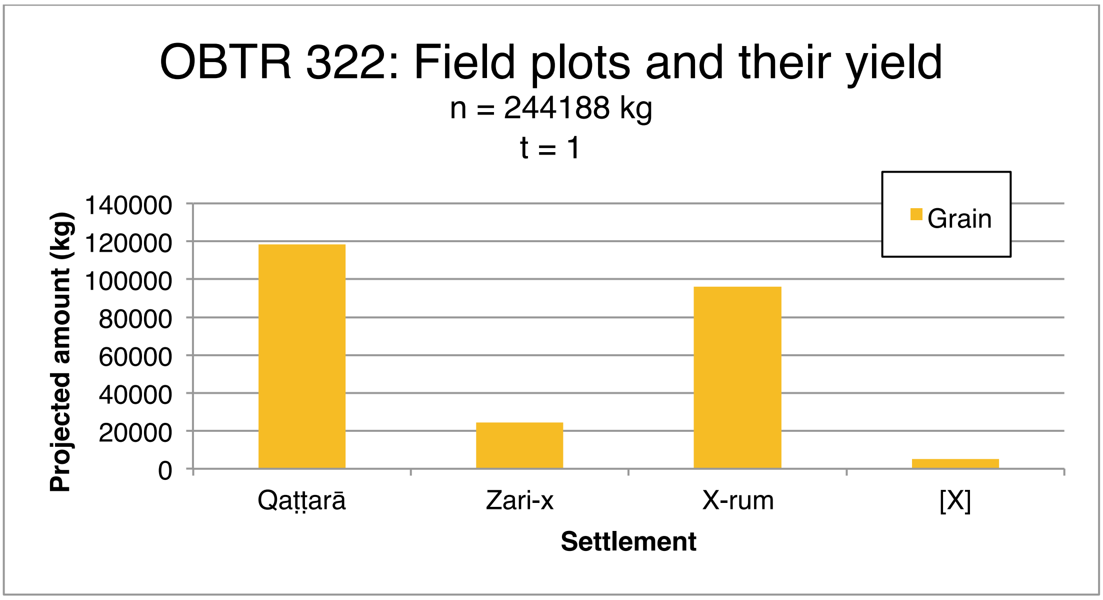


Figure 9.67: OBTR 322: Projected amount (columns) calculated from field plot extent and ordered by associated settlement (*qa*/litre ratio of 1:1)

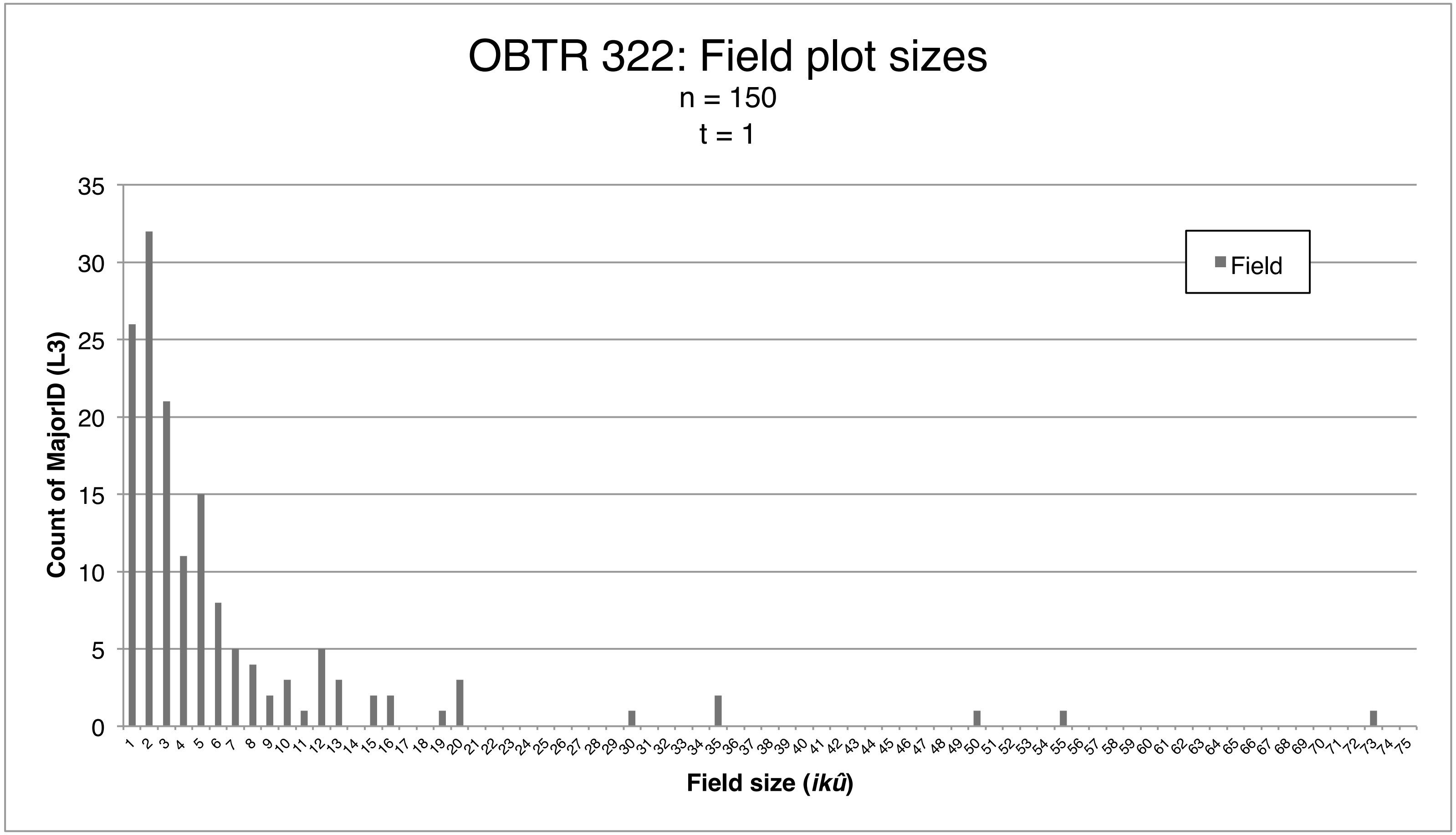


Figure 9.68: OBTR 322: Field plot sizes at Qaṭṭarā and associated settlements

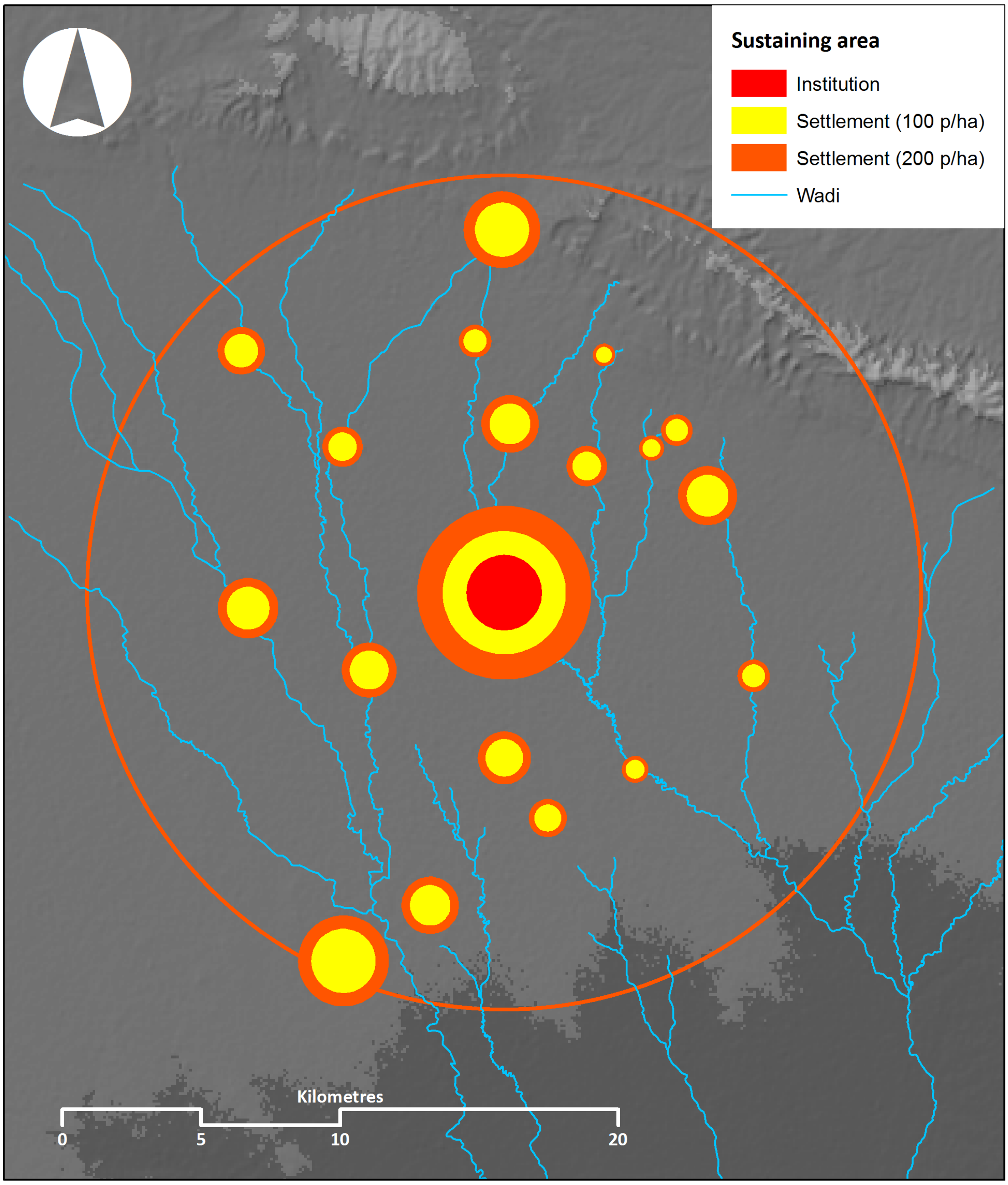


Figure 9.69: Settlement sustaining areas within the Qaṭṭarā micro-region (700 kg/ha)

9.3.3.1 Qaṭṭarā: settlement and micro-region

The settlement record collated for the micro-region around Qaṭṭarā draws on multiple sources of published and unpublished archaeological survey material (see 16.2). At 28 ha, the estimated population of Qaṭṭarā would have been 2,800 to 5,600 people, giving an annual consumption rate of 1,050 to 2,100 tonnes. Within the defined micro-region, we can include 19 Middle Bronze Age settlements with an aggregate area extent of 72.07 ha, thus an estimated population of 7,206 to 14,413 people. This range, in turn, generates an estimated annual consumption of an average 2,702.525 to 5,405.05 tonnes of cereals (Figure 9.69). Viewed against these figures, the expected produce of the agricultural lands listed in OBTR 322 attains a magnitude that mirrors earlier examples. The approximated c. 245 tonnes given above represent 11.67-22.33% of the site total, and 4.5-9% of the micro-region as a whole. Using the higher projected extent of field plots contained in OBTR 322 more or less doubles these figures.

9.4 Tillage capacity: the rate of ploughing

I have reviewed the scale of cereal production and consumption within the institutional household economy and explored the scalar relationship between organisation, settlement, and micro-region. In the present section, we will review approximate tillage rates as a function of the number of plough oxen appearing in administrative records from individual sites (Table 9.54). In a preceding chapter, I discussed the tillage capacity of draught oxen and plough teams (7.4), and I use here the derived figures to calculate the extent of agricultural land that could be tilled by agricultural workers. The resulting figures for tillage capacity and projected yield offers an alternative perspective on figures presented in the preceding section, and thus enables us to consider production capability against documentation on grain production and consumption.

	Oxen	Plough teams (6-8 oxen)	Tillage capacity		Average yield	
			10 ha/span	30 ha/team	By span (t)	By team (t)
Alalah	28	3-5	150	90-150	135*	81-135*
Tuttul	60	3	300	90	270*	81*
Ašnakkum	50	6-8	250	180-240	175**	126-168**
Šehnā	30	4-5	150	120-150	105**	84-105**
Šušarrā	30	3-5	150	90-150	135*	81-135*

Table 9.54: Tillage capacity of draught oxen appearing in the managerial record

The calculated average yield employs again the benchmark values of 900 kg/ha (*) for irrigation agriculture and 700/kg/ha (**) for dry-farming cultivation (4.2.1.4). As a logical consequence of the relatively similar numbers of plough oxen found at individual sites, average yields are roughly comparable. I would also note the general agreement between tillage capacity of spans of two oxen (which is estimated on the basis of a wide range of ethnographic and historical examples) and of teams, which is established through examples taken from the cuneiform record.

As such, the management of draught oxen in the field does not appear to impinge critically upon the calculations given here. In the next section, let us consider numbers derived from analysis of grain production, consumption, and tillage capacity in a comparable perspective.

9.5 Comparing scale: critical comments

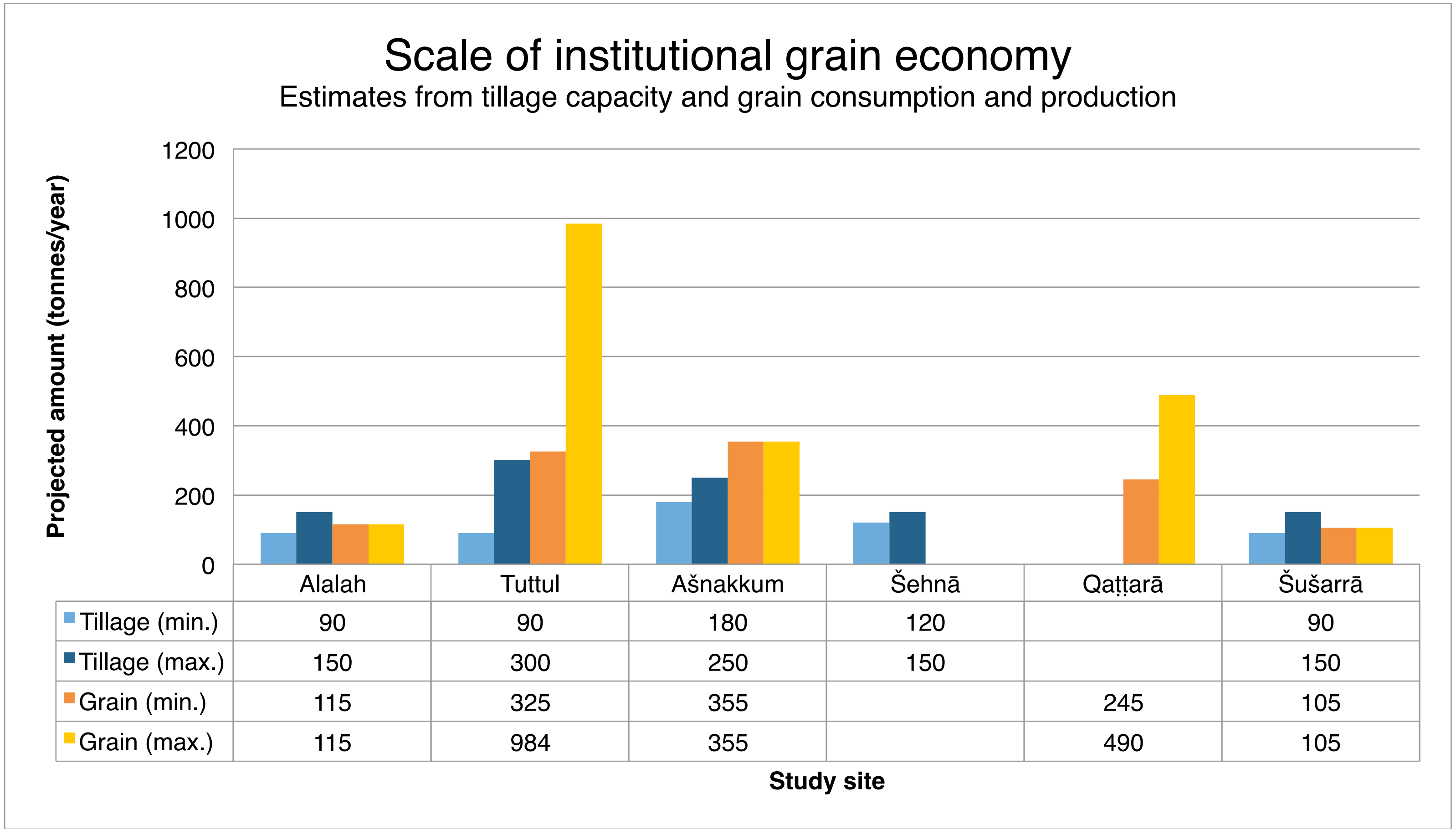
Table 9.55 provided below juxtaposes tillage capacity and projected yield based on the number of plough oxen with the scale of cereal production and consumption established from analyses of records of receipt and disbursement. The right half of the table provides estimated subsistence needs for parent site and micro-region respectively, within a range of 100-200 persons/ha. The figures emerging from calculations based on tillage capacity are interesting in their relative inferiority to figures derived from receipt and disbursement records. Further, yield rates based on tillage capacity do not factor in expenses for sowing seed. If so, an average reduction of perhaps 10-20% should be in order. Interpreting cereal yield from tillage capacity is dependent on reliable estimates of area yield, which are extremely variable within the general region. As such, the calculations deriving from tillage capacity should be deemed suggestive at best. There are, however, some valuable points to be drawn from this table. In the case of Tuttul, for example, the c. 1,000 tonnes of barley accounted for in KTT 120 would have required an *average* yield of c. 3,300 kg/ha if this amount should have been produced through the use of institutional draught oxen alone, a yield which seems highly unlikely. Less pronounced discrepancies may point in the same direction, namely at Ašnakkum, where the projected annual consumption is drawn from a particularly extensive assemblage, and also outmatches production rates drawn from tillage capacity with c. 50-100%.

This discrepancy could indicate the difference between direct and indirect agricultural production, namely between agricultural production undertaken by palace personnel and institutional livestock vis-à-vis production received from tenant agriculture. Of course, this requires us to assume that an average yield of 700-900 kg/ha is a reliable benchmark. There is otherwise little indication of a consistent distinction between direct and indirect infrastructures of agricultural production in the documentation surveyed here. Most notably, the administrative assemblages incorporated into the dataset demonstrate a complete absence of any consistent or extensive body of documentation on taxation in kind. Postgate has remarked upon the similar lack of such documentation in Middle Assyrian sources (Postgate 2013).

To the extent that institutional household administrators were collecting part of their cereal stock as tribute or taxes, they did not account for it in a consistent manner in the administrative documentation. This is an important point to stress, because it suggests a relatively high level of agreement between the amount of resources acquired by harvest time and that consumed annually.

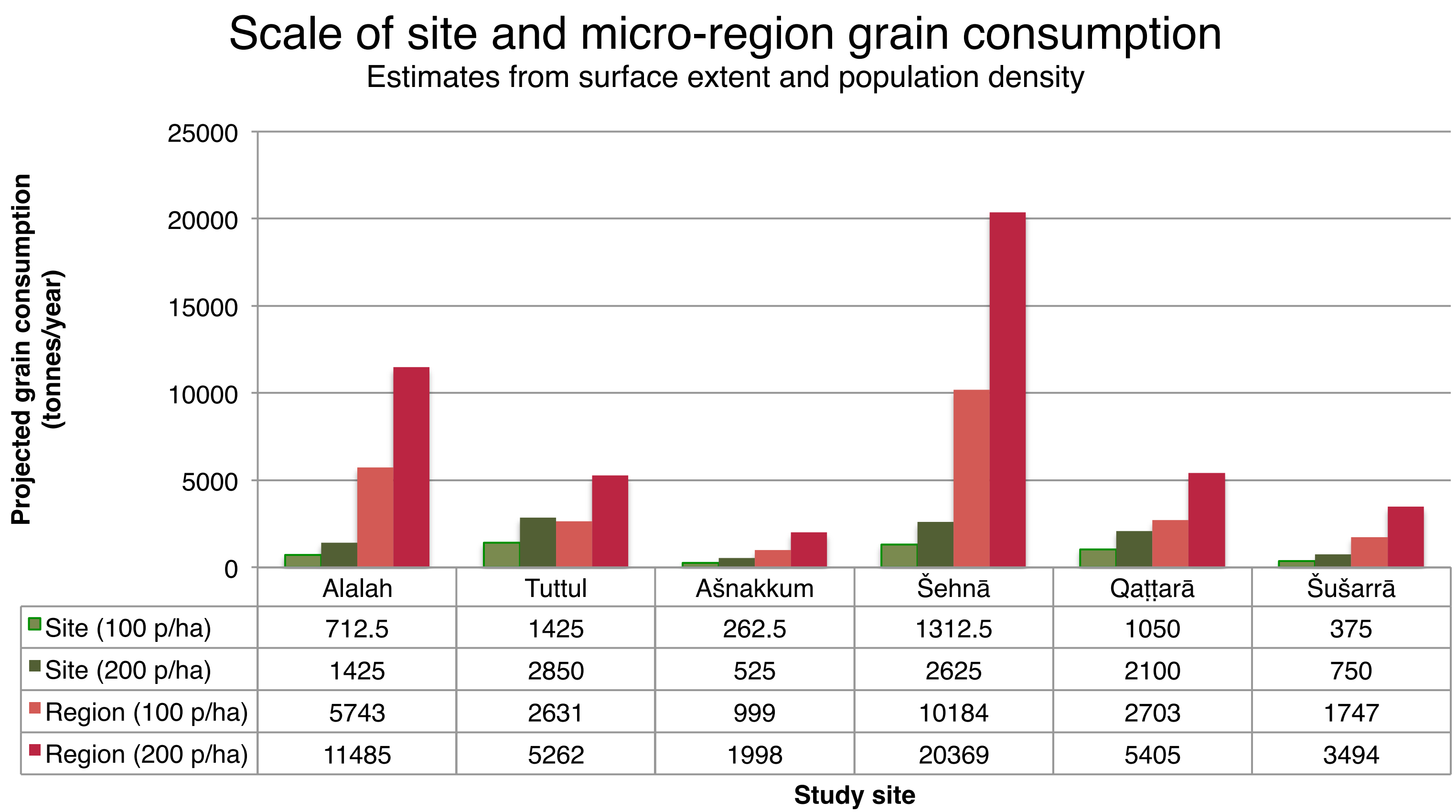
	Site size (ha)	Institutional household (tillage capacity and cereal consumption)					Settlement and hinterland (cereal consumption)			
		Plough oxen			Accounted		Site		Micro-region	
		Oxen	Tilled (ha)	Yield (t/y)	Produced (t/y)	Consumed (t/y)	100 p/ha (t/y)	200 p/ha (t/y)	100 p/ha (t/y)	200 p/ha (t/y)
Alalah	19	28	90-150	81-135	-	115	712.5	1425	5742.5	11485
Tuttul	38	60	90-300	81-270	325-984	-	1425	2850	2631	5262.5
Ašnakkum	7	50	180-250	126-168		355	262.5	525	999	1998
Šehnā	35	30	120-150	84-105	-	-	1312.5	2625	10184	20369
Qaṭṭarā	28	-	-	-	245-490	-	1050	2100	2702.5	5405
Šušarrā	10	30	90-150	81-135	105	-	375	750	1746.8	3493.7

Table 9.55: Scale of institutional cereal economy at study sites as derived from tillage capacity and administrative records, juxtaposed with subsistence requirements for parent site and micro-region.



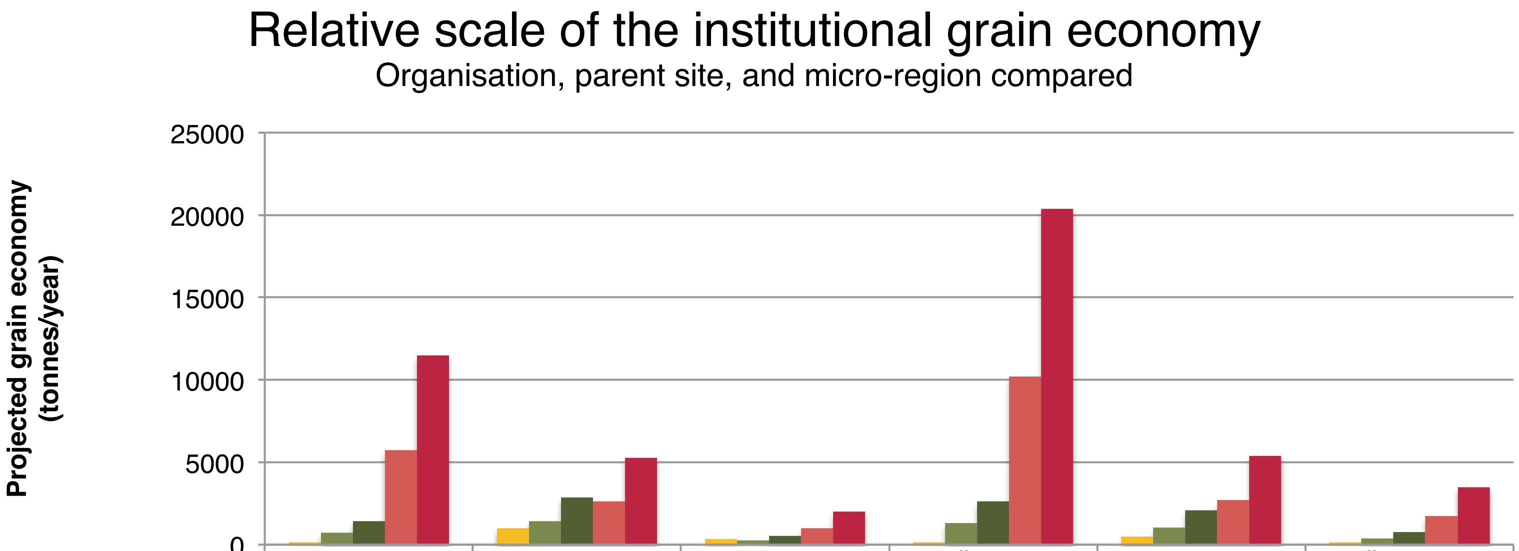
	Alalah	Tuttul	Ašnakkum	Šehnā	Qaṭṭarā	Šušarrā
Tillage (min.)	90	90	180	120		90
Tillage (max.)	150	300	250	150		150
Grain (min.)	115	325	355		245	105
Grain (max.)	115	984	355		490	105

Figure 9.70: Scale of institutional grain economy as seen from minimum and maximum values derived from tillage capacity and grain consumption and production.



	Alalah	Tuttul	Ašnakkum	Šehnā	Qaṭṭarā	Šušarrā
Site (100 p/ha)	712.5	1425	262.5	1312.5	1050	375
Site (200 p/ha)	1425	2850	525	2625	2100	750
Region (100 p/ha)	5743	2631	999	10184	2703	1747
Region (200 p/ha)	11485	5262	1998	20369	5405	3494

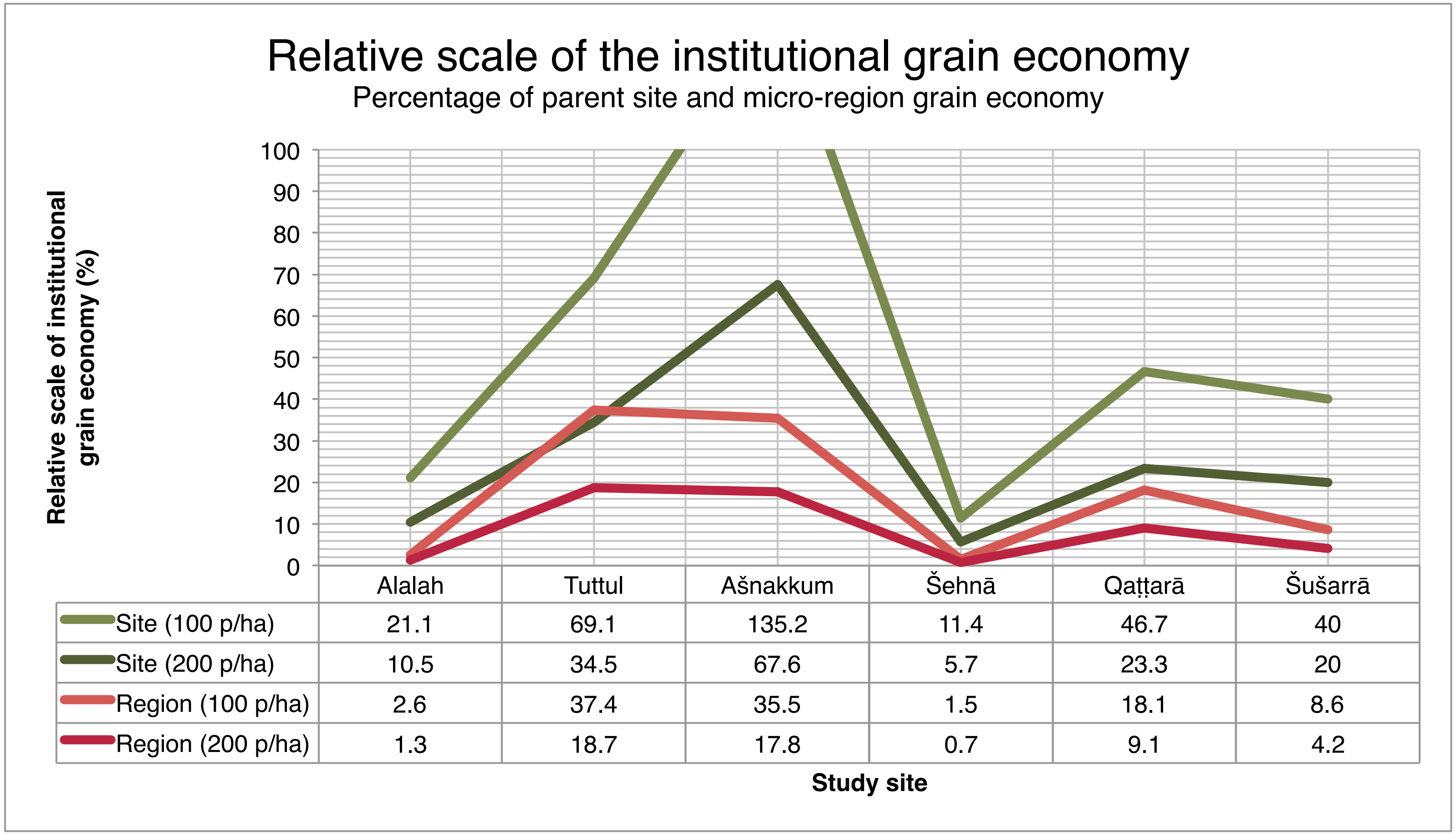
Figure 9.71: Scale of grain consumption of associated parent settlement and micro-region derived from settlement surface extent and estimated population density.



	Alalah	Tuttul	Ašnakkum	Šehnā	Qaṭṭarā	Šušarrā
Organisation	150	984	355	150	490	150
Site (100 p/ha)	712.5	1425	262.5	1312.5	1050	375
Site (200 p/ha)	1425	2850	525	2625	2100	750
Region (100 p/ha)	5743	2631	999	10184	2703	1747
Region (200 p/ha)	11485	5262	1998	20369	5405	3494

Study site

Figure 9.72: Scale of institutional grain economy compared to parent settlement and micro-region.



	Alalah	Tuttul	Ašnakkum	Šehnā	Qaṭṭarā	Šušarrā
Site (100 p/ha)	21.1	69.1	135.2	11.4	46.7	40
Site (200 p/ha)	10.5	34.5	67.6	5.7	23.3	20
Region (100 p/ha)	2.6	37.4	35.5	1.5	18.1	8.6
Region (200 p/ha)	1.3	18.7	17.8	0.7	9.1	4.2

Figure 9.73: Scale of institutional household economy expressed as percentage of grain economy of parent site and micro-region.

Figure 9.70 supplied above orders minimum and maximum values of the institutional grain economy at each of the six study sites as derived from estimated tillage capacity and from grain production and consumption respectively. Columns then demonstrate a variety of means by which to measure annual grain production and consumption. With regards to Tuttul and Qaṭṭarā, markedly higher values are generated by different interpretations of KTT 120 and OBTR 322, described in more detail above.

Figure 9.71 presents annual subsistence needs of the associated parent site and micro-region at 100 and 200 persons/ha, the basis of which was discussed earlier (4.2.1.2). Figure 9.72 juxtaposes the *highest* value from the four sets of calculations on the scale of the institutional grain economy with the four sets of calculations on site and micro-region subsistence needs. Finally, Figure 9.73 expresses the derived relationship of these numbers using the institutional grain economy as a percentage of the four calculations on site and micro-region subsistence needs. Evidently, the most significant degree of variation in the last figure is between the political economy and the subsistence needs of the parent site. Thus Ašnakkum, whose 7 ha Middle Bronze Age settlement is eclipsed by the annual consumption of the institutional household economy when using a population density of 100 persons/ha, and leaves less than 35% of overall needs outside the institutional infrastructure at 200 persons/ha. The only other example that exceeds 50% of estimated subsistence needs of the parent site is Tuttul (at 69% with 100 persons/ha).

As we have already seen, the proportional relationship between institutional economy and parent site subsistence needs may provide interesting perspectives on the impact of political economies upon subsistence infrastructures within a given settlement. If we want to obtain a comprehensive understanding on the infrastructural basis needed to amass these resources, the proportional relationship between institutional economy and micro-region is a better proxy, however. This relationship is indicated by the last two line graphs in Figure 9.73 above, and demonstrates a more consistent trend; most examples fall below 20% of the aggregate subsistence needs of the associated micro-region, and in some cases, e.g. Alalah, Šehnā, and Šušarrā, hover around 5% or less. Higher values coincide with poor survey records, i.e. Tuttul, where no satellites within the Euphrates Valley are accounted for, and Ašnakkum, the hinterland of which has not been consistently investigated.

The analytical value of the established proportional relationships is, of course, subject to discussion, but two points should be noted. The first is the incomplete picture emerging from a focus on the relationship between institutional economy and parent site subsistence needs in isolation. We have already seen that economic infrastructures of the institutional household regularly transcend the boundaries of the settlement within which it is physically embedded. The second is that the economic scale of each of the six cases included in the above figure fall within a relatively well-defined continuum of 100-500 tonnes of cereal resources annually. I substantiate the latter point in more detail in the next chapter.

The scale and extent of political economies

10 Discussion

A critical discussion of the analytical perspectives advanced in the preceding section should address both the reliability of the methodology employed and, subsequently, the wider social and historical implications of its findings. Both aspects are addressed in the present chapter. I begin with a discussion of the textual dataset and means of evaluating its representative value, primarily through temporal and quantitative patterns emerging from the administrative record. In the second section, I turn to discuss general perspectives on institutional scale as these emerge from the analyses presented in preceding chapters.

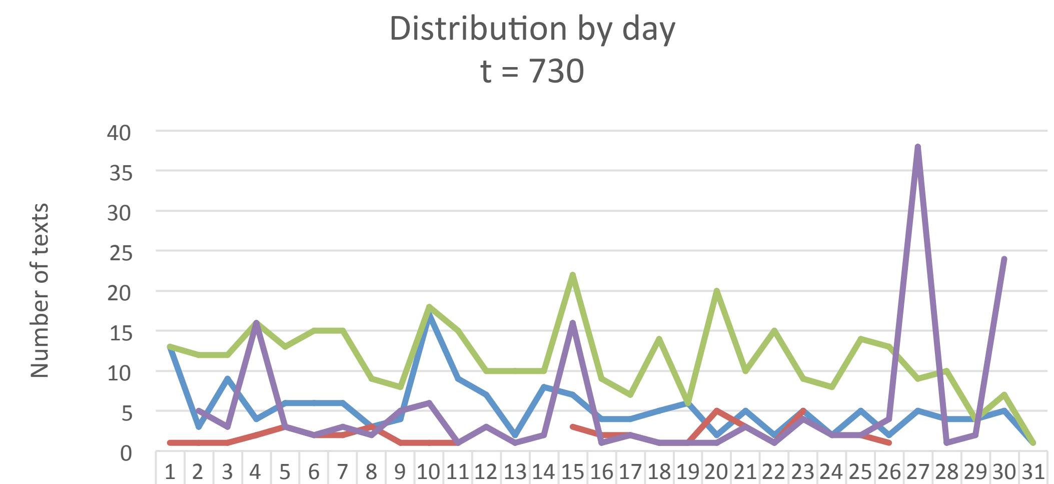
10.1 Methodological concerns: sample reliability

In Chapter 5, I advanced an analytical perspective on the textual corpus founded on the contention that the core property of administrative cuneiform records is to account for and order material resources in space and time. Information on managerial origin, conveying entity, and the particulars of social context of the recorded exchange may vary considerably according to localised scribal practices and the particular needs of a given recording system. The basic information that can be derived from an administrative account, however, will almost inevitably provide data on resource type, its amount, and, in most cases, the timing of the exchange, and the immediate beneficiary or purpose of the resource in question. From this basic set of information, I have explored ways in which scalar relationships within the institutional household economy can be compared across a spatially and, potentially, diachronically diverse set of individual historical examples.

The general reliability of this data set can be evaluated with reference to two common variables; consistency in terms of temporal frequency, namely the distribution of texts across monthly and annual transects, and consistency in terms of substantive information, namely patterning in the amount of resources accounted for in a given record. In the two sections below, I offer briefly some statistical perspectives on both aspects and the level of confidence we can assign to its interpretation on the basis of these.

10.1.1 Temporal ordering: days, months, and years

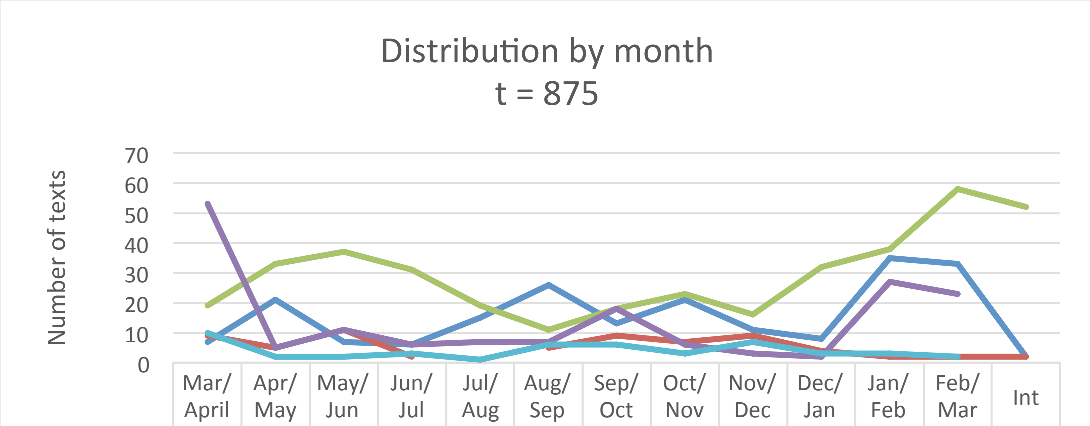
Queries on the distribution of dated texts within monthly and annual transects demonstrate a relatively even distribution of the administrative record over time, which may be taken as a proxy of representative value. If administrative records are products of repetitive managerial actions, then regularity in distribution across common managerial time periods, e.g. months (Figure 10.74) and years (Figure 10.75), should provide some level of certainty with regards to the scale and frequency of resource circulation. These are general observations, naturally, and less conclusive at the level of the individual assemblage or study site. Discrete bodies of texts may distort the picture, as the cattle tags from Tuttul issued on the 4th, the 15th, and the 27th day of the month (see 8.1.3) in the figure on daily distribution below. What is emphasised by both graphs is that the documentation extends across the entirety of the annual cycle within which I have discussed economic infrastructures in preceding chapters.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ASZ	13	3	9	4	6	6	6	3	4	17	9	7	2	8	7	4	4	5	6	2	5	2	5	2	5	2	5	4	4	5	1
QAT	1	1	1	2	3	2	2	3	1	1	1		2		3	2	2	1	1	5	3	1	5		2	1		1		9	
SZE	13	12	12	16	13	15	15	9	8	18	15	10	10	10	22	9	7	14	6	20	10	15	9	8	14	13	9	10	4	7	1
TUT		5	3	16	3	2	3	2	5	6	1	3	1	2	16	1	2	1	1	1	3	1	4	2	2	4	38	1	2	24	

Day of the month

Figure 10.74: Distribution of dated texts by day of the month



	Mar/ April	Apr/ May	May/ Jun	Jun/ Jul	Jul/ Aug	Aug/ Sep	Sep/ Oct	Oct/ Nov	Nov/ Dec	Dec/ Jan	Jan/ Feb	Feb/ Mar	Int
ASZ	7	21	7	6	15	26	13	21	11	8	35	33	2
QAT	9	5	11	2		5	9	7	9	4	2	2	2
SZE	19	33	37	31	19	11	18	23	16	32	38	58	52
TUT	53	5	11	6	7	7	18	6	3	2	27	23	
ALA	10	2	2	3	1	6	6	3	7	3	3	2	

Figure 10.75: Distribution of dated texts by month of the year

10.1.2 Substantive patterns: quantities and their distribution

Next to spatial and temporal distribution of the textual assemblage, let us consider patterns emerging from substantive data. The scatter plot contained in Figure 10.76 below orders individual texts contained in the data set according to aggregate amount of resources accounted for in the text, and the number of individual entries across which this amount is distributed. This is a simple way of illustrating first the quantitative range in which a given resource appears in an administrative record, second the number of entities across which this amount is divided. While minor series or spatially located samples may demonstrate marked variation, the overall distribution, especially within more extensive series on beer or grain disbursements, demonstrate relatively consistent ranges in terms of resource quantities and in terms of average number of transactions contained in single texts. This graph also underscores perspectives advanced in preceding chapters (e.g. 6.11 and 7.8). Here, the colour coding divides individual resource types into three broad groups, first cereals, legumes, and sesame, second derived cereal products, namely groats, flour, bread, and beer, and third all other types of subsistence resources, e.g. sweeteners, fats, fruits, vegetables, meat, and wine.

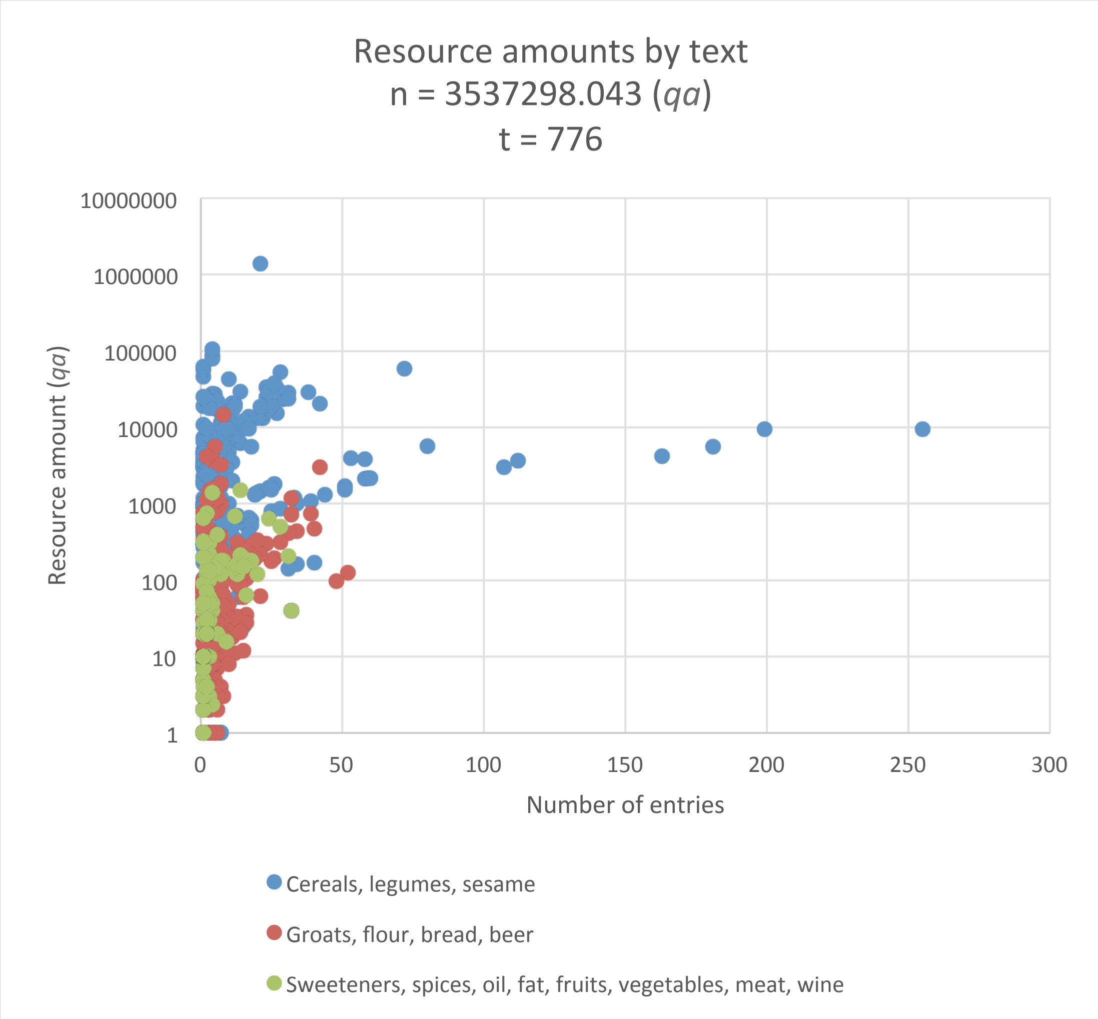


Figure 10.76: Scatter plot of individual texts with unique resource quantities (y-axis, logarithmical) and the number of entries across which these quantities are divided (x-axis)

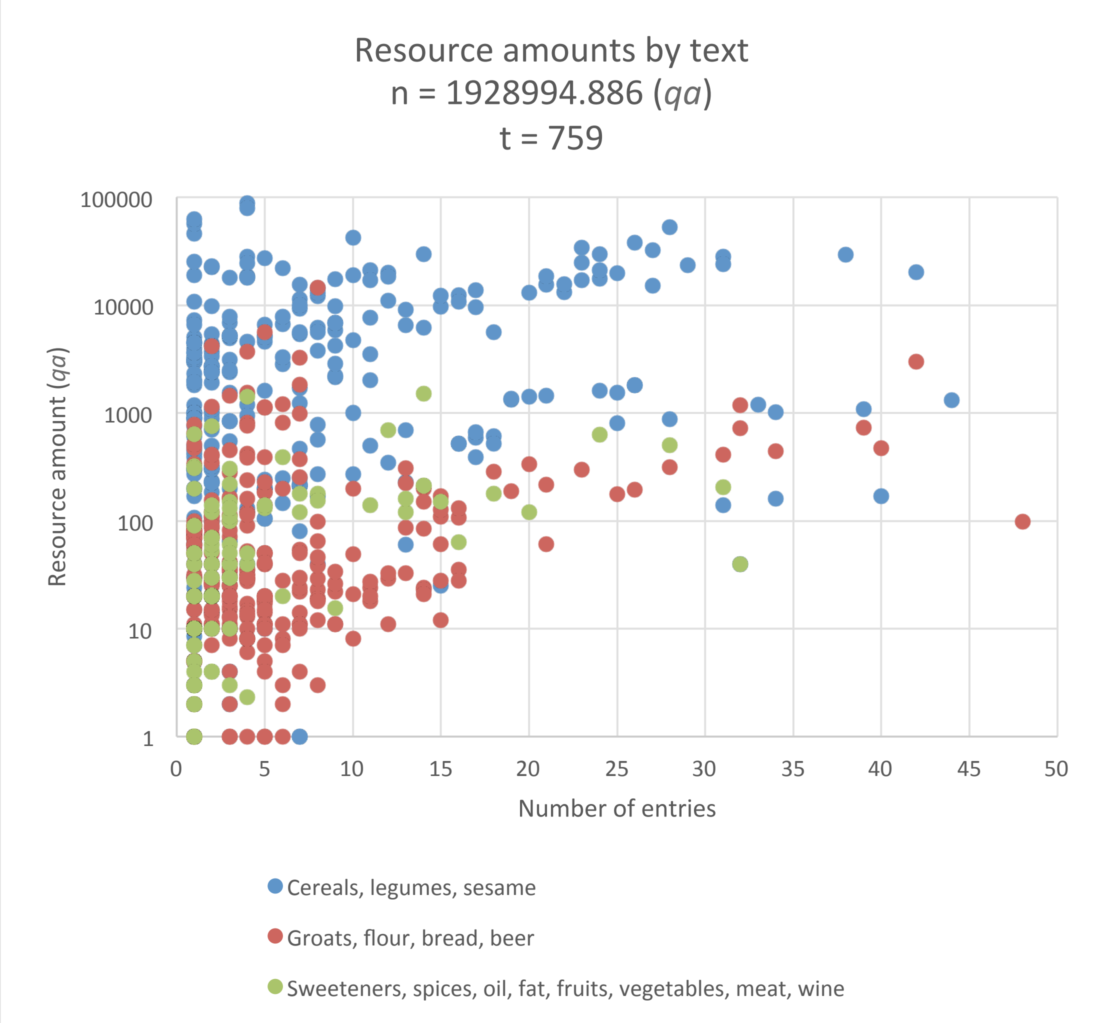


Figure 10.77: Scatter plot of individual texts with unique resource quantities (y-axis, logarithmical) and the number of entries across which these quantities are divided (x-axis). Detail of Fig. 10.76 (see above)

Removing outliers either >100000 *qa* or >50 entries, as is done in Figure 10.77, amplifies this distributional pattern. In general terms, this chart then suggests a definable range for the amount of a given resource that appears in texts contained in the dataset. Extreme deviations, as those included in the full chart above, are quite few in number.

There is, of course, no secure way of accurately assessing the representative value of a body of historical documents as far removed from us in time as those under consideration here (the wider philosophical problem of source reliability has been extensively discussed by historians, e.g. Evans 2000, 75-128, Carr 2001, 1-24). What has been attempted here is merely to suggest that, when presented with a range of samples of a contemporary date, stemming from comparable social institutions, and relating to similar managerial practices, we should be able to identify glimpses of a pattern, and consequently to define a probable range within which missing parts of the picture should logically fall. The particular nature of the cuneiform corpus, in terms of media, usage, and preservation (5.1.1), lends further credibility to such an approach. The graphs presented above suggest, in other words, that the administrative documentation underpinning the dataset employed here does not constitute a wholly arbitrary body of information, neither in terms of temporal distribution, nor in terms of substantive information. Unless we assume that six different archaeological locales subjected to excavation of varying intensity by different researchers with different aims would produce assemblages exhibiting a similar pattern by sheer coincidence, the above discussion then provides a reasonable degree of certainty with regards to the more general representative value of the conclusions advanced in preceding chapters (a thorough review of the social and archaeological context of individual text collections is given Appendix 1). With this evaluation of our dataset in place, let us turn to discuss the theoretical and historical implications of its findings.

10.2 Interpreting scale

We can now review in more detail the principal points emerging from analyses of economic infrastructures given in preceding chapters. These follow and elaborate upon dietary patterns and subsistence regimes (Chapter 6), crop regimes (Chapter 7), and infrastructural constraints related to draught animal power (Chapter 8). In light of these, we will subsequently discuss first the level of internal scalar agreement between individual examples of institutional households, second their relationship to their parent site and hinterland, and thirdly the general implications of these figures in light of current understandings of political economies of the Early, Middle, and Late Bronze Ages of the Ancient Near East.

10.2.1 Infrastructures of diet and subsistence

The distribution of subsistence resources is a widely acknowledged hallmark of the institutional household economy, revolving around monthly issues of cereal and oil and annual issues of clothing (Gelb 1965, also Postgate 1994, 237-240, Pollock 1999, 117-123, van de Mieroop 1999, 134-135). Economic scale is typically assessed with reference to the number of individuals in receipt of grain rations (e.g. Grégoire and Renger 1988, Sallaberger and Pruß 2015). As such, the extent of the grain economy becomes an indicator not only of grain consumption but of economic dependency in general, i.e. the reliance of the individual upon the institutional household for the satisfaction of the entirety of dietary requirements.

In 6.11, I argued that the majority of grain rations issued by the institutional household would support a standard diet for a single individual, leaving a relatively small excess amount for exchange or feeding relatives. Yet it is evident from the cases considered in the present study that there is little or no agreement in scale between the circulation of cereals and, perhaps, legumes and sesame on the one hand, and vegetables, fruit crops, and processed foods such as beer, flour, bread, fats, sweeteners, and wine on the other. Annual production and consumption rates of barley totalling more than a hundred tonnes at least within the individual institutional economy far outmatch average amounts of supplementary foodstuffs, With beer, for example, the number of brewers, the amount of malt or beer grain issued, and the agreement between raw products received and beer disbursed demonstrate a surprising degree of consistency (6.7.6). This suggests that beer consumption, the other fundamental half of a standard Bronze Age meal, remained, in relative terms, a household industry, in the case of the palatial nucleus accounting for some 30-70 persons, but certainly not extending beyond that on anything but special occasions (e.g. Sallaberger 2012). Documentation on flour and bread accentuate managerial infrastructures of a similar extent, while more valuable resource types, e.g. sweeteners, fruit crops, and meat, appear in quantities sufficient only for a very limited number of individuals. Issues for larger numbers of people appear in particular, rather than repetitive, cases. I have suggested that the balance of institutional livestock holdings served to supply a line of secondary products, namely traction (cattle) and fleece (sheep and goat). The presence of these two groups of livestock in specific contexts, i.e. fattening houses, indicate systematic and intensive meat production, but not at a scale that would seriously impact upon the supply of secondary products. A substantial share of meat consumed on a daily basis within the institutional household nucleus might as well have been supplied by hunting, fishing, fowling, and, most importantly, pig rearing (8.10).

In other words, the balance of people receiving grain rations from the institutional household needed further nutrients to sustain life, and while the source of these nutrients must remain largely speculative, the observations presented here suggest that the institutional household did not supply, and indeed was not able to supply, a comprehensive diet to anyone but a limited number of their dependants. In light of these numbers, the notion of 'dependency' on the institutional household economy should be viewed with considerable qualification. Rather than envisioning redistribution as an undifferentiated subsistence package extended to all members of a given economic infrastructure, institutional household economies abided by constraints both in terms of production capacity, labour requirements in terms of processing, and consequently socioeconomic divisions in terms of the intensity of subsistence infrastructures and the number of people these encompassed (a similar position has been advanced for Egypt, cf. Padgham 2014, 110-111). A few received all of their daily upkeep from institutional economic infrastructures. Others enjoyed access to processed goods, i.e. flour, beer, oil, and textile products. The vast majority of individuals encompassed by the institutional economic infrastructure shared only in the unprocessed fruits of extensive cereal cultivation, and the occasional event of commensal celebration. And beyond these, as demonstrated in Chapter 9, was the majority of the population, untouched by the managerial infrastructure of the institutional economy.

10.2.2 Crop regimes and infrastructures of agricultural production

This perspective on dietary regimes and subsistence infrastructures can be meaningfully substantiated by turning to crop regimes. The numbers assembled and discussed in Chapter 7 underscore the dominance of three types of cultivars in extensive agricultural regimes, namely barley, sesame, and, less conclusively, fodder legumes (7.8). Qualifications abound, of course, e.g. at Alalah, where emmer was also extensively cultivated, and at Šušarrā, where we find more robust amounts of legumes, e.g. lentil, common pea, chickpea and bean appearing in harvest records. Both of these sites occupied more fertile environmental habitats than their counterparts in the Jazīrah plains. In the latter area, wheat taxa are, on the whole, ephemeral cameos to the predominance of barley, and legumes haphazard in appearance at best. Even within palatial households, so relatively rich in documentation on pricey commodities such as wine, oil, sweeteners and fish, legumes are issued in modest amounts, and generally for household-level consumption.

This is not to suggest that most legumes and more demanding vegetable crops were not cultivated by the institutional household, but namely that they were cultivated on a scale closer to that of ordinary household economies, probably making a correspondent use of orchard floors and manured or watered fields to produce legume crops for a smaller and more exclusive group of people. The equally poor level of documentation on fruit crops may substantiate these arguments further. If we assume the number of gardeners appearing at any one palatial household to have some bearing on the scale of vegetable and fruit cultivation, then we see again an economic regime geared towards the needs of a social unit many times smaller than what is suggested by the grain economy. Figs, grapes, pistachio and almond could all have been dried and stored beyond the high season of late summer and early autumn, but, if so, they wholly escape the managerial record, and the attestations that are available to us suggest that receipt and issue of fruit and nuts courtesy of the institutional household infrastructure were, on the whole, rare in occurrence and minor in scale.

10.2.3 Draught power as a scalar proxy of extensive agriculture

The importance of draught power for sustained extensive agricultural regimes places critical emphasis on the availability and maintenance of draught animals, specifically oxen, by the institutional household economy. Halstead has championed a similar argument with regards to traditional Mediterranean agriculture (Halstead 2014). To take a benchmark example, I suggested earlier that an agricultural economy employing 30-60 draught oxen would require a breeding herd with at least 50-150 cows to sustain, say, an annual restocking of 10% of their traction capacity (see for a more elaborate outline of the many variables involved e.g. Campbell 2000, 135-139). This means that the working basis of extensive agriculture would, in turn, have necessitated a substantial breeding stock, a resource that managers were willing to invest with grain fodder during winter and early spring. Draught animals further increased fodder needs, as seen e.g. in the share of annual grain consumption at Ašnakkum taken up by plough oxen (9.1.1). The present dataset is less outspoken about measures taken to amend depleted fodder storage or failed harvests, but we should note one account of silver expenses from Šehnā, which demonstrates that the institutional household was able and willing to purchase grain from outside in order to maintain a healthy stock of draught oxen through the winter, and in order to retrieve sowing seed for the next cycle of winter crops (Ismail 1991, 109-116 and Text 103).

It is worth considering how the availability of draught oxen impacted upon extensive cereal cultivation. In 7.8, I pointed to the magnitude of three particular groups of crops within harvest accounts and disbursement records, namely barley, fodder legumes, and sesame. The first two are more amenable to arid or poor soil conditions, and easier to harvest than the majority of other legume crops for human consumption. The third, being a summer-crop, would work well within rotating crop-regimes, and further bypass logistical constraints occurring during spring harvest. These are simple, and very functional perspectives to apply to a historical reality that may have been much more complex, but serves to highlight areas in which the infrastructural power of the institutional household would have allowed for an extended scale of agricultural production.

10.2.4 The relational nature of the political economy

In addition to these substantive features, let us consider a key structural characteristic of the economic infrastructures discussed above. As pointed to occasionally in preceding chapters, the organisation of the political economy demonstrates a substantial level of spatial fluidity, traversing multiple physical loci that extend well beyond the confinements of their parent site (Eidem 2000, Meijer, Ristvet 2008, 2012). At Tuttul (9.2.1), Qaṭṭarā (9.2.3), and Šušarrā (9.2.2), textual documentation aptly demonstrates that institutional production relied on input from settlements situated at some distance from the managerial centre. Herding and grazing patterns, particularly for sheep and goat, but also cattle, betrays a similarly versatile use of particular landscape forms (8.10). This relational infrastructure was, however, not confined to the mere exploitation of particularly suitable ecological niches, nor to a contiguous territory. Estates located further afield occasionally appear in the managerial record. Kuwari, from his residence below the Zagros main crest, supervised properties of his own in valleys further east (8.2.3). Sîn-iqišam of Ašnakkum dispatched agricultural managers, workers, and oxen to tend to his estate at Ekallatum (8.1.3) while his scribes measured out many tonnes of grain annually for the estate of Šubat-Enlil next door (9.1.2). Institutional households, rather than being a reflection of a localised and easily hierarchized settlement system, were the principal nodes of a network that traversed a social, rather than a strictly physical, landscape (see for a discussion of these examples Rattenborg in press). This mode of spatial organisation also introduces another layer of complexity to our interpretation of social arrangements within individual settlements. Take, for example, Šehnā during the period under consideration here; in the mid-18th century BCE, a mere hundred meters apart, we find the estate of Qarni-Lim and the Lower Eastern Town Palace of the kings of Apum (van de Mieroop 1994, 341-343). Comparable levels of social and physical proximity emerge in the ’Afār Plain. The household at Qaṭṭarā would not have been more than a short day’s journey from the principal residence of Iltani’s husband and overlord (16.2). It follows that the individual settlement is then not void of intersecting or co-existing institutional infrastructures, a level of social entanglement that is hard to properly account for in a simplified model. We will return to the wider implications of these observations shortly.

While basing itself on a different type of data, the above points accentuate household concepts advanced elsewhere in the literature and at the very outset of this study (1.1). Numerous authors have commented upon the pervasive role of terms such as ‘house’ and ‘household’ in native definitions of political or religious economies (e.g. Oppenheim 1964, 95-97, Yoffee 1977, Gelb 1979, Pollock 1999), while Schloen has discussed at length the structuring power of patrimonial social organisation in Bronze Age society at large (Schloen 2001). Countering reigning notions of urbanism and early state formation as founded upon the revolutionary appearance of social hierarchies, bureaucracy, and class, Ur has recently argued for a metaphorical extension of the patrimonial household order as an emergent vehicle of early political economies, a change in scale, but not in character, of practices commonly understood to Bronze Age communities (Ur 2014). Adding a material perspective, the differentiation in scale of various resource infrastructures within the political economy advanced in the present study suggests that a fair share of economic activity within the institutional household of the Middle Bronze Age mimicked past and more modest scales of economic organisation. Processing and consumption of most processed agricultural and animal resources, in terms of resource amounts and the number of recipients, did not extend very far beyond the palatial nucleus. The produce of extensive cereal cultivation, on the other hand, could be increased through expanded cattle holdings, and consequently extended to a larger body of beneficiaries. While I support and advance a notion of the institutional household as founded upon a patrimonial structure, this entails no preference for either a substantivist or formalist appreciation of Bronze Age economic practice in more general terms. To properly evaluate the findings of the present study with regards to such matters, we need first to consider scalar perspectives on the political economy in a comparative framework.

10.3 Scaling the political economy

The picture emerging from the above discussion is then that the economic infrastructure of the political economy was characterised both by differentiation in terms of the scale and intensity observed in the production, circulation, and consumption of key agricultural products, and by spatial fluidity in terms of its physical organisation. While we can relate the cases considered here to a principal settlement, their economic activities could and did transcend the physical sphere commonly associated with their parent site (10.2.4). If we wish to consider the economic scale of historical examples in a comparative perspective, we must therefore first define a reliable unit of measurement. In the present study, I have advanced a tripartite analytical framework, namely organisation, settlement, and micro-region (see Chapter 4). When considering economic scale and political power in a regional perspective, great care should be taken not to confuse one with the other. For example, Sallaberger and Pruß claim that close to the entirety of the population at Early Bronze Age Nabada (Tall Baydar) was dependent upon the redistribution of cereals to the urban community, while at the same time stating that the settlement would have been dependent on its satellites to acquire sufficient cereals for its inhabitants (Sallaberger and Pruß 2015). There are no logical problems with either of these contentions when viewed separately, but if the agricultural production of related rural settlements played a role in supporting the principal settlement, then a quantitative comparison must necessarily also include that part of the population that was resident in the rural settlements in question, in addition to those in the centre benefitting from their work. If so, then the dependency of the entire population of Nabada on a single redistributive economy becomes a property local to the site itself, rather than a characteristic of the settlement system in its entirety (Widell's discussion of tillage capacity produces alternative conclusions, cf. Widell *et al.* 2013a). In reviewing the findings of the present study, let us begin then by looking at quantitative estimates of organisational scale and how they compare with examples from related studies. Subsequently, we can expand our discussion to include the magnitude of political economies relative to parent site and micro-region.

10.3.1 The economic scale of the political organisation

In Chapter 9, I assessed organisational scale based on several variables, namely cereal consumption, cereal production, land holdings, and tillage capacity. For the majority of cases included in the dataset, estimated figures fall within a relatively well-defined range, if measured by cereal consumption around 100-500 tonnes annually (9.4). This is relatively consistent both in terms of attested consumption rates in disbursement records and in terms of tillage capacity. Figures diverging from this general range do occur, namely in the case of Tuttul, where the total amount of cereals accounted for in KTT 120 includes close to 1,000 tonnes. I have observed that only some 350 tonnes of cereals recorded in this text were explicitly marked for consumption by the governor's palace, but this must obviously remain a speculative point.

Let us look at some comparable examples; in a recent study on the Early Bronze Age palace at Tall Baydar, an estimated 1,600 people comprising the institutional workforce would have required approximately 600 tonnes annually, to which we must add fodder for draught animals (Sallaberger and Pruß 2015, 114). A singular text from Ebla discussed by Grégoire and Renger accounts for a total 34,320 tonnes, purportedly for annual consumption (TM.75.G.1700, cf. Grégoire and Renger 1988, 223-224). While an extreme number, it mirrors compound accounts from core districts of the Third Dynasty of Ur giving annual harvests of close to 25,000 tonnes (see discussion of examples in van de Mieroop 1999, 130-134). Other examples from the alluvial plain are much more modest. From Pre-Sargonic Lagaš, Maekawa has discussed an institutional harvest account totalling c. 635 tonnes of barley and wheat (Maekawa 1974, Table 1). A record from Umma, dating to the Third Dynasty of Ur, lists a total 2,925 tonnes contained in the city granaries, suggested by Dahl to comprise the whole of institutional agricultural production within the city and its hinterland (AAICAB 1 1912-1143, cf. Dahl 2007, 52 and 60). Individual household expenditures within a similar range are available also from contemporary Girsu and Lagaš, in an account comprising institutional consumption from six different locales in the southern alluvium amounting to an aggregate of more than 9,000 tonnes (Maekawa 1999, Table 1). Compound accounts, as those discussed by van de Mieroop, runs into the tens of thousands of tonnes annually, but extend to include the produce of entire regions encompassing multiple individual households (1999, 130-131). While they illustrate the immensity of agricultural resources agglomerated by an imperial polity, assessing their magnitude at a local level requires further analyses that cannot be undertaken here.

From the Middle Bronze Age alluvium, we can add Breckwoldt's study of cereals stored at Larsa, Out of a series of records on harvest yields, YOS 5 176 appears to give the fullest account of overall institutional production, landing us at around 1,550 tonnes (Breckwoldt 1996, 70, see Butz 1979, 331 for critical comments). Late Bronze Age examples from the dry-farming plains are more in tune with cases found in the current study. Annual yields of winter crops at Dūr-katlimmu, on the Khabūr River, are documented for a period of more than a decade, and so provide a particularly solid empirical basis for assessing the scale of agricultural production (e.g. the important study by Reculeau 2011). The highest annual yield emerging from this series amounts to 84,000 *qa* (BATSH 9, Text 60, cf. Röllig 2008), which, if assuming a high conversion rate of 1.6 litre/*qa* translates into just over 87 tonnes. Surprisingly, yields from the contemporary *dunnu* at the site of Ṣabī Abīaḍ in the Balīkh Valley are much higher, even when using a 1:1 ratio of *qa* to litres, i.e. the almost 431 tonnes calculated by Wiggerman (consider also the lower figure of 300 tonnes given in T-98-33, cf. Wiggermann 2000, 180-182 and 205, Text 182). Barring the extreme case of Ebla and the core cities of the Third Dynasty of Ur, this haphazard lot does suggest some essential degree of patterning. Middle and Late Bronze examples from the dry-farming plains range from c. 100 and up to 1000 tonnes annually if allowing for a considerable margin of error. Early Bronze Age cases from the alluvium are markedly higher, i.e. from 1,000 and up to 3,000 tonnes for individual locales. It should be noted that several of these also include a larger number of satellite settlements. As a whole, these are suggestive, rather than conclusive observations on a body of documentation not subjected to the same level of scrutiny as the assemblages considered in the present study. But the above survey does point to quantifiable ranges within which we can begin to build a more consistent interpretation of economic scale.

Two recent studies have attempted to gauge more conclusively the scale of Bronze Age political economies; Padgham (2014) by way of modelling the material and infrastructural needs of the estimated total population of Late Bronze Age Egypt and Cyprus, and Paulette (2015) by calculating grain storage capacity from excavated storage facilities at a range of Early Bronze Age sites distributed across the Tigris-Euphrates drainage. While neither their aims nor their methods are entirely commensurate with the approach advanced here, they both represent rare and important quantitative assessments of Bronze Age political economies relevant for our present discussion. The latter study is especially important, as it covers a range of examples both from the Jazīrah and from the alluvium to the south. Summing up overall storage capacity from individual sites within specific periods, Paulette identifies two general clusters (2015, Figure 6.12). One includes the majority of examples studied, where central storage capacity falls between 0-500 tonnes per site. Another counts three major settlements, namely Fara, Tall Brāk, and Ur, and yields estimates ranging from just below 1000 and up to 4000 tonnes per site. Notwithstanding reservations about the reliability of the latter group (Paulette 2015, 168), these ranges compare well with references for individual household organisations presented above, and further with the individual cases presented in preceding chapters. Drawing on Kemp's study of the granaries of the Ramesseum at Thebes (Kemp 2006, 257-259 and Figure 294), Padgham stresses the very particular nature of grain storages exceeding capacities of 10,000 tonnes in New Kingdom Egypt and argues instead for a cereal economy bound to smaller and more widely dispersed local stores (Padgham 2014, 110-111).

I will not attempt to refine further the disparities between discrete ranges emerging from this overview, as this would stretch the available evidence beyond its abilities. From a general perspective, however, the above examples suggest both a tangible upper ceiling to the amount of cereals that could have been stored or controlled by any one discrete economic organisation, and some broad trends with regards to the average size of individual political economies. By considering the examples included in the present study in light of their local and regional setting, we can extrapolate this point further.

10.3.2 Comparing organisation, settlement, and micro-region

To expand upon our scalar perspective, let us consider the magnitude of the political economy in light of the subsistence needs of their parent settlement and micro-region. As already demonstrated, the six cases reviewed in this study share characteristics in terms of environmental configuration, site size, and in the context of their social and political setting within the historical transect under consideration (4.2). Two further points emerging from our analyses should be stressed: First, all cases are associated with the principal settlements within the local settlement hierarchy, a fact suggestive of a spatial agreement between the physical location of the institutional household and the central place within a localised group of settlements. This link is less clear in some cases, e.g. in the Rānīah Plain, where Bazmusian is not far behind Šušarrā in terms of site extent and located in an equally central part of the valley (17.2), or in the Khabūr, were Ašnakkum is matched by Amaz a relatively short march to the east (14.2). Second, and on the other hand, the cases presented here offer little support for a clear relationship *in economic scale* between organisation and parent settlement. As seen in 9.4, we find little in the way of a direct and proportional relationship to the cereal requirements of the parent settlements. The institutional household at Ašnakkum, with its modest 7 ha of occupation, is certainly not economically inferior to political economies found at Alalah, Šušarrā, or Qaṭṭarā on present evidence. The political economy at Alalah, in particular, is a poor reflection of the magnitude of the associated settlement region, and similar positions could be advanced for Šušarrā. As such, the numbers and scalar relationships defined here run counter to the traditional conceptual association of settlement hierarchies and site size with political structure. Site extent appears, whether explicitly acknowledged or tacitly assumed, a common yardstick for the appreciation of social, economic, and political power in current research (e.g. Flannery 1998, Earle 1987, Palmisano and Altaweel 2015). Site hierarchies are consequently regarded a means of identifying hierarchical political structures, either as a reflection of administrative organisation or as a proxy of urban scale and social stratification (Wright and Johnson 1975) or, conversely, in order to underscore a decline in political centralisation and control (Palmisano 2015). In more general terms, postulating an agreement between settlement organisation and political structure contradicts empirical observation, especially when considering local geographical configurations or historical examples of political and territorial organisation (Wilkinson 2003, 211). At the methodological level, simplifying models that attempt to derive from settlement systems a concordant political structure has faced increasing criticism recently (Kantner 2008, 41-42, Ristvet 2008, 596-598, Rattenborg in press). The relational nature of institutional household infrastructures sketched above adds further weight to this latter line of argument, especially with regards to the debated application of modern notions of territoriality and spatially contiguous spheres of political power to past societies (Smith 2003, Smith 2007, 2008, VanValkenburgh and Osborne 2012, see also Elden 2009). Consequently, attempts at modelling political control through settlement data alone risks simplifying a political landscape that was, by most indicators, far more complex.

While critical, the above serves to evaluate rather than discard some common, but sometimes not sufficiently scrutinised positions on the power emanating from the Bronze Age institutional household. As demonstrated in 9.4, none of the institutional household economies considered here could have aspired to control the entirety of the grain economy within their designated micro-region. In fact, when considering only datasets built from complete and intensive surveys, i.e. Alalah and Šehnā, the institutional grain economy constitutes well below 5% of overall subsistence requirements when using local population density figures of 100-200 persons/ha. Relatively coherent, but less intensive surveys, i.e. Qaṭṭarā and Šušarrā, produce ratios ranging from 5% to just below 20%. Only with an incomplete survey record, as those from Ašnakkum and Tuttul, do we attain markedly higher rates from c. 20-40%. Although they should be approached with caution, I view these as very suggestive figures when considered in comparison. An annual rate of institutional cereal consumption in the hundreds of tonnes across six different cases can hardly be dismissed as a freak coincidence. This is less of an attack upon the political power of the Bronze Age political economy than it may seem, but it requires us to revise and rephrase some central aspects of its conceptualisation. We will turn to this matter in the next section. First, let us take a brief excursus to discuss the implications of the above ratios and the observations given in Chapter 9 for economic theory as applied to the Ancient Near East more generally.

10.3.3 A comment on economic structure and theory

The conclusions drawn from Chapter 9 impinge critically upon past – and current – debates regarding the economic structure of Bronze Age society and the infrastructural power of the early state (for concise summaries, see Snell 1997, 145-158, van de Mieroop 1999, 108-123, Manning and Morris 2005, Jursa 2010, 13-26, Padgham 2014, 4-10). Even if many cuneiform specialists have offered potent critiques of past interpretations of the Bronze Age Ancient Near East as steered by all-encompassing redistributive palace or temple economies (1.1 and 1.2), the notion of the omnipotent state economy is still advanced in general readers and specialist literature (e.g. Renger 2007, 188-189, Liverani 2005, 2013, 28-30, Avilova 2012, Dale 2013). The conflation of a particular social entity with a particular form of societal organisation has furthermore served to instil a tacit link between i.e. 'palace' and 'state', a conceptual association that often adds further confusion (van de Mieroop 2004, 55 on Lipinski, 1979). With regards to the scale of the Bronze Age political economy, or the magnitude of the early state for short, the joint findings of the present thesis and recent related studies point in the same overall direction. Padgham offers a forceful illustration of the poor agreement in scale between the material and logistical requirements of a Bronze Age society and the infrastructural capability of its political organisations (Padgham 2014, 110-111). Paulette, while admitting several possible explanations for the modest size of Early Bronze Age storage complexes emerging from his own study, raises the possibility that the political economy might have been of a much more modest scale than that often conveyed in general accounts (2015, 191-192). In light of the sample discussed in previous chapters and numbers derived from the general literature presented earlier in this chapter (10.3.1), a more emphatic reappraisal of these conclusions should be made here: quantitatively speaking, there is no empirical basis to support a notion of the Bronze Age state economy as encompassing all or nearly all of society.

Considering the wealth of quantitative information from within the archaeological and textual record that has been brought to bear on this question by the present and related studies, this contention is less a philosophical fancy than an empirical fact.

These statements, however, relate only to the *scale*, not the *structure*, of the political economy. A firm understanding of the material magnitude of the early state does not impinge critically upon opposing substantivist and formalist theories, and I intend here no categorical embrace of either one. What I do wish to stress is that the scale of the political economy relative to its social setting, as derived from examples considered in the present study, leaves open a very substantial tract of the social sphere for alternative economic networks, be it the individual farmer, the village community, or the merchant. The palaces of Alalah, Tuttul, Ašnakkum, Šehnā, Qaṭṭarā, and Šušarrā certainly represented large and potentially powerful economic units when measured against the estimated subsistence needs of the surrounding townscape. When considered against their local hinterland, anything within less than a day's march from the palace gate, they were soon outmatched by the cumulative economic ability of towns and hamlets. The degree to which the balance of this wider transect of their social environment was integrated into the economic infrastructure of the institutional household seems, when judging from the datasets advanced here, sporadic in extent and temporary in duration. An estimation of political power of these palatial organisations, and the social impact of such entities within the two centuries of the Middle Bronze Age under consideration here, should take these infrastructural constraints into account.

10.4 Measuring power

I began this study by laying out a conceptual understanding of the institutional household as a term that binds together intersecting networks of economic, political, and ideological agency within a tangible social and physical unit (Chapter 1). As such, I perceive of the cases considered here as embodying proximate and intersecting networks of economic and political action, and while we have focused on the material aspects of the political economy, an assessment of its political power remains a key element of our general inquiry. I have argued that the institutional household economies found at the six study sites managed significant agricultural assets, but also that infrastructures of production, circulation, and consumption of key resource types demonstrate tangible differences in scale. Barley, sesame, and fodder legumes appear in significantly larger amounts than virtually all other resource types figuring in administrative records. The scale of distribution of processed resources, i.e. flour, bread, and beer, is significantly smaller, while more precious commodities, such as wine, sweeteners, meats and fat are limited to proximate members of the household nucleus (10.2.1). In addition, the political economy, being a social entity rather than a material artefact, extends over a relational space not strictly commensurate with the settlement system in which it is situated (10.2.4). The practice of agriculture, the herding of livestock, and even the possession of real estate habitually transcend or undercut easily drawn concentric circles of power and control found in otherwise useful conceptual shorthand. Finally, the scale of the political economy relative to its wider social base, its parent site and, more forcefully, its associated micro-region, indicates that the institutional household of the Middle Bronze Age Jazīrah and adjoining regions was a very far cry from the powerful early city- or territorial state conjured by traditional narratives (10.3.1 and 10.3.2).

10.4.1 Qualifying early state power

How should we perceive of the political power of the institutional household in light of these impressions? First, let us stress the interrelatedness of political power and material infrastructures. Mann's key contention, that social networks "overlap, intersect, entwine, and sometimes fuse, in ways that defy simple or unitary explanations" (Mann [1993] 2012, viii) aptly enunciates the mutually reinforcing powers of economic and political agency nested in many social formations. The interrelation of material wealth and political power has been illuminatingly discussed with reference to Bronze Age polities by several authors, e.g. the emphasis on the materialisation of ideology as a key formative element of chiefdoms and early state polities (DeMarrais *et al.* 1996). A similar argument underpins Routledge's recent monograph on early state formations in archaeology, in which he stresses the hegemonic nature of the power exercised by the Third Dynasty of Ur, and its dependency upon shared notions of political authority and ideology (Routledge 2014, 127-156). Rather than assuming the presence of a tangible and formalised structure of governance, the latter author focuses on the ability of early state polities to adapt, emulate, and alter social interaction through the appropriation of ideological and symbolic networks and institutions.

These propositions echo recent qualifications of Weber's archetypical definition of the state as a body politic founded upon the means of physical coercion. To Scheidel, for example, critical attention should be drawn to the distinction between laying political claim to, rather than exercising actual control with, a given physical territory (Scheidel 2013, 5-6). Introducing a much more fluent concept of political agency, such a perspective runs counter to traditional views on state power, which have been criticised at length for advancing an erroneous notion of political authority as aspatial, unitary, all-encompassing, and prone to obscure the myriad of underlying – and often conflicting – currents of social action that served to form it (Abrams 1988, Mitchell 1991, Smith 2003, Geertz 2004). I have already emphasised the relational character of the institutional household economies considered here, and others have discussed comparable patterns of social organisation with regards to their political agency with specific reference to Bronze Age examples (Eidem 2000, 2014, Meijer 2000, Ristvet 2008, Brown 2013, Guichard 2014). The emergent picture, further enforced by trends in social anthropology, stresses the relational nature of political organisation and their network character (Smith 2007, 2008).

The general notion of more widely disseminated institutions or networks of political ideology and symbolism as founded upon the tangible organisations or infrastructures of powerful economic entities accentuates Mann's distinction between authoritative and diffused power forms (4.1.2). As demonstrated earlier, the spatial aspect of this dualism emphasises the extensive nature of the latter in contrast to the intensive character of the former. The current study has dealt overwhelmingly with the material means of the Middle Bronze Age political economy, much less with its symbolic reach, and so care should be taken not to advance the argument beyond what is warranted by the data presented here. But to the extent that the polities founded upon the economic organisations reviewed here exercised lasting control with a more extensive tract of society than that illuminated by the administrative documentation, their power was enshrined, to a large extent, in diffused networks relying on shared norms, beliefs, and ideas. And while powerful in their expression of kingship, as the hosts of commensal celebration, or the leaders of a military campaign, or the recipients of tributary gifts, such power forms are reliant upon continuous social affirmation that could break down quickly when not tied to a lasting material infrastructure. A power form, if not bound to a social organisation, a network or an infrastructure of continued practice and social reaffirmation, "can't *do* anything", to quote one apt observer of Mann's social theory (Schroeder 2006, 6).

This view of course assumes that the dataset presented here is indeed able to represent the whole or, at the very least, the balance, of the institutional household infrastructure, and certain limitations in our documentation should be pointed out at this juncture. We have, for example, not concerned ourselves with exchange or trade in metals, clothing, or tools conducted by the political economy, even though administrative records on the circulation of such products, although few and often far apart, can be found in the dataset. Given the size of the textual sample considered in the present study, the absence of some types of administrative records becomes conspicuous. The vast majority of amassed agricultural resources went to maintain workers, dependants, and livestock, and the dataset is generally void of consistent documentation on alternative streams of income and expenditure. Most importantly, there are no comprehensive assemblages accounting for goods obtained from sustained practices of tribute or taxation (noted also in 9.4). Postgate has recently pondered the corresponding lack of such records from a wide range of Middle Assyrian corpora (cf. Postgate 2013, 341, consider also Hudson 2000). If lasting infrastructures of agricultural resource management existed outside the organisational outline sketched here, then the documentation is surprisingly inept at demonstrating it. The notion of infrastructural permanence advanced here and in the preceding paragraph introduces an appreciation of resilience over time. What level of lasting impact could the political economies considered here have exercised on their social world? At this juncture, let us turn to the final element of this discussion, namely the role of the institutional household, both as an economic organisation and a political agent, within the two centuries of the Middle Bronze Age under review in the present study.

10.4.2 The political economy in the Middle Bronze Age

As I have argued elsewhere, the social infrastructure of the political economies included in our analyses demonstrates a marked degree of local resilience in the face of the volatile political history of the 18th and 17th century BCE (Rattenborg in press). Political discourse, as emanating from epistolary sources, often honed lineages of local rulers that stretched back for centuries. Architectural sequences offer comparable hints of institutional longevity underneath the changing faces of local lords, kinglets, and governors. And while representing settlements of a modest size relative to regional political centres, all of the examples included in this study were recognised as worthy political entities by their contemporaries. As such, they illustrate the widespread pervasiveness of institutional households and local power networks across the Bronze Age and their componential, yet critical role in the passing concentration of power in hegemonic and geographically extensive imperial formations (Dahl 2007, 131-137, Garfinkle 2008, Barjamovic 2013, Ur 2014).

On the other hand, their material abilities were limited, as demonstrated in the preceding chapters and most forcefully in Chapter 9. While the above points serve to highlight their structuring power in a local perspective, quantitative assessments advanced earlier underscore infrastructural constraints that would have weighed heavily upon attempts towards regional expansion of the material power base of any one political organisation (consider sections in 10.2). Labour and livestock, as evident in the case of the Ašnakkum household, could move, but references to the movement of bulk commodities over longer distances are extremely rare in the present dataset. The decentralised nature of administrative control, even within some of the foremost political formations of the day, emphasises this point, as does the waxing and waning of regional polities and the resilience of local power structures. Charpin's discussion of the complex web of managerial nodes within the Old Babylonian palatial economy stresses similar patterns (Charpin 1987). The allocation of individual estates to high-ranking magnates within Zimri-Lim's kingdom is another case in point (van Koppen 2002), a means of diffused managerial control also traced elsewhere in Bronze Age documentation (e.g. at Umma during the Third Dynasty of Ur, cf. Dahl 2007, 136-137, also Garfinkle 2008, 60-61).

The fluid nature of political power, and its grounding in a very tangible, but relatively constrained economic organisation should encourage us to linger over the role of more mobile transects of society. While thoroughly researched (e.g. Kupper 1957, Anbar 1991, Fleming 2004), extensive tribal networks as those appearing in epistolary sources from Mari make little, if any lasting appearance in administrative documentation from the six study sites. An emphasis on pastoralist means of subsistence habitually enters such discussions, but a tangible divide between distinctive forms of economic action does not emerge from the administrative documentation considered here. As demonstrated in 8.10, sedentary communities were equally capable of exploiting distinct ecological niches in the rearing of livestock, espousing herding patterns now more commonly associated with pastoralist economies. In an economic sense, pastoralist and sedentary modes of production are then better viewed as symbiotic infrastructures, the functional benefits of which have been highlighted by several commentators (e.g. Meijer 2014, Schou 2015, 232-261, more generally Tapper 1990). This suggests differentiation in degree, rather than in character, between economic networks of the desert and the sown. The elusive nature of herding and pastoralism in the archaeological record inhibits elaboration, but recent research on the fringes of the Syrian *al-Bādīah* betrays tacit material links between core settlement areas in the dry-farming plains below the Taurus and select grazing areas around Djabal Bišri beyond the Euphrates (Fujii and Adachi 2010, 74-75).

At the political level, the prominence of tribal networks e.g. in the workings of the kingdom of Zimri-Lim represents a potent example of kinship as an important variable in the exercise of political power (especially Fleming 2004, 229-231). But this sort of expression of collective power was not limited to tribal confederacies, as documentation on the role of assemblies and communal decision-making within village and town make clear (Fleming 2004, 236-238, Seri 2005, 187-196). Zooming out, tribal groups, like city councils or village communities, were all contributors to a complex web of competing and cooperating networks of political, economic, and ideological power. Rather than serving as an ornamental superstructure to an established economic and political organisation, the ideological aspects of royal power were key to maintaining and reaffirming relations with principal elements of the more diffused power structures of Bronze Age society.

10.4.3 Dispersed networks and relational polities

A model impression of political economies and their role within the history of the Middle Bronze Age as drawn from the findings of the current study emphasises then local resilience and regional dispersion. Individual institutional households, as those surveyed here, constituted local infrastructural hubs, powerful economic entities within their local setting, but with limited or highly temporary reach beyond their immediate environs. The material power of regional polities, the realms of Šamšī-Adad, of Yahdun-Lim, Zimri-Lim, of Yamhad and Qaṭna relied upon the agglomeration of these localised economic powerhouses within loosely defined political hegemonies, drawing extensively upon widely shared and commonly acknowledged institutions of kingship, kinship, and patrimonial social structure. And yet, while highly pervasive across the Jazīrah and adjoining regions, the extent of these shared notions of political ideology and representation are not matched by a comparable level of lasting economic integration and managerial centralisation. This broader synthesis is not a novel one, as a quick survey of the past two decades of research will make clear (Stein 1998, Schloen 2001, Yoffee 2004, Barjamovic 2013, Cancik-Kirschbaum *et al.* 2014). What the present study has added is a comparative and quantifiable perspective on the material capabilities of individual political agents, as a means of appreciating both their local potential and their regional constraints.

The lack of regional integration of these local infrastructures limited the organisational resilience of emergent territorial states. The passing polities of charismatic, individual leaders withered from the swift breakdown of ideological hegemony in the wake of their deaths. The lack of a clear and measurable impact upon local economic infrastructures indicates that the balance of regional polities introduced little lasting change to the powers of the polities that reigned in their various sections of plains, piedmonts, and river valleys. A sustained drive towards the formation of a truly *territorial* political infrastructure - in Trigger's definition of the concept (2003, 92-120) - came about only with the emergence of the Middle Assyrian polity towards the end of the Bronze Age. Further beyond, this gradual absorption of local economic hubs into a wider-reaching system of politically infused exchange laid the groundwork, in organisational, administrative, and technological terms, for the Neo-Assyrian imperial administration. These are, of course, conjectural propositions, whose confirmation would require yet another study to dismiss or confirm. It will serve here as a hypothetical measure of the enduring importance of the much more modest polities that lay at the core of a resilient and long-lived drive towards the formation of lasting complex political and economic organisations.

11 Conclusion

In Chapter 1, I began by outlining and discussing the notion of the institutional household and related concepts within the present study and within the general literature. Subsequently, I situated this concept in past and current discussions of ancient economies, and laid out the structure for the study of its material power base. In the following chapters, I reviewed first the environmental characteristics of the dry-farming plains and piedmonts that skirt the southern flanks of the Taurus and the Zagros mountains, emphasising the substantial degree of ecological variation observable within the study region (Chapter 2). Second, I outlined the historical framework within which the six study sites were situated (Chapter 3). The theoretical and methodological underpinnings of this study were outlined in Chapter 4, where I formulated and integrated analytical perspectives derived from Mann's theory of social power networks (cf. 4.1) with elements of settlement archaeology (cf. 4.2). Foundational to this merger is my notion of social infrastructures as the materialisations of social organisation and the tangible embodiment of the practices of social networks with a formal analytical structure focusing on organisations, sites, and micro-regions. In presenting a novel, standardised data format for the ordering and analysis of resources and quantities in the cuneiform record, I introduced the empirical basis for tracing economic infrastructures emanating from the institutional household. A concise overview of the data structure and the information contained in it was undertaken in the following section (Chapter 5). Review and analysis of select parts of the assembled dataset was undertaken in the following section.

This section is comprised by Chapters 6, 7, 8 and 9, in which I provided an analysis of the production, circulation, and consumption of basic subsistence resources contained in the dataset according to a simple, tripartite model of the institutional household economy. First, in Chapter 6, I discussed subsistence requirements and the infrastructures of consumption relating to the disbursement of raw and processed foods, namely grain, flour and bread, beer, fats, sweeteners and wine, within the urban environment. Second, in Chapter 7, I turned to consider institutions of agriculture and the outline of the agricultural year, before reviewing principal crops appearing in the textual and archaeological record. In the latter half of Chapter 7, I outlined and discussed key variables of the agricultural regime, focusing especially on tillage capacity, sowing rates, reaping and crop processing. Third, in Chapter 8, I reviewed and discussed livestock holdings based on the assembled dataset, highlighting the importance of cattle as a source of draught power, and further the importance of pig and fowl in intensive meat production regimes, breeding of various types of livestock, and practices of grazing and transhumance. In Chapter 9, I developed a comparative perspective on the scale of the economic infrastructure of institutional households based on my analyses of the various elements of resource production, circulation, and consumption provided in Chapters 6, 7, and 8. Here, the integrated approach to textual and archaeological datasets advocated in the second section of the thesis comes to its fruition, as I demonstrated how the overall scale of production and consumption of cereals within the institutional household economy can be meaningfully related to archaeological survey (cf. 9.4). By comparing the scale of the institutional grain economy to benchmark subsistence figures for the parent settlement in isolation and the associated micro-region in aggregate, I offered a quantifiable model of the economic magnitude of political economies relative to their societal context. The numbers generated by this model suggests that institutional household economies were certainly significant economic agents compared to their social environment, but also that they cannot aspire, on present evidence, to encapsulate anything resembling the 'majority' of the social realm (cf. 10.3). These findings were further substantiated through a review of other examples found in the literature, which suggests a relatively well-defined range in terms of production capacity of staple cereals (cf. 10.3.1).

In Chapter 10, I provided a discussion first of the reliability of the analyses and conclusions advanced and the representative value of the underlying dataset (10.1), second of the principal arguments arising from this study (10.2-4). The central argument evolving from the analyses presented in Chapters 6-9 is that the Middle Bronze Age institutional household within the designated study regions constituted perhaps 5% of the overall grain economy of their associated micro-region. Adopting a holistic approach to infrastructures of subsistence emerging from the managerial record, I further qualified this statement, suggesting that whereas the production and consumption of grain certainly remains the key proxy for assessing economic scale, the circulation of other resource types should warn us against assuming that the receipt of grain implied full economic dependency (especially 10.2.1, also preliminary discussion in 6.11).

These findings offer some weighty alternative perspectives to our understanding of the ancient economy, of settlement organisation, and the interaction of social networks and the physical landscape. As pointed to in the preceding chapter, there is little in the way of conclusive evidence for a correlation between organisational scale and the size of the parent settlement (10.3.2). Relating the institutional economy to the associated micro-region produces more consistent ratios, although the reliability of these calculations must necessarily be considered against the quality of the underlying survey datasets. Methodologically speaking, the study has demonstrated that it is possible to relate quantitative information from administrative cuneiform assemblages to archaeology at a regional and comparative level. With some modifications, a similar approach can be developed for diachronic studies, allowing for investigations into the scalar relationship of organisations and settlement regions over time. On a related note, the general agreement in scale of various resource infrastructures, suggests something else, namely that we can derive and extrapolate from discrete bodies of administrative texts some more general quantitative impressions on the economic magnitude and societal impact of institutional households with a reasonable degree of certainty.

11.1 Critical comments

I regard the principal findings of this study suggestive rather than conclusive. I have assembled a typical model of the institutional household economy from a range of historical examples, and while several of the cases presented, e.g. the scale of beer production (6.7.6), elements of livestock holding (8.1.1.1), and the magnitude of the grain economy (9.4) fall within surprisingly well-defined ranges, they are naturally vulnerable to critique when approached individually. While I have attempted to define formal methods of assessing the representative value of the dataset (10.1), the extent to which the reader may find such arguments useful remains, to a considerable extent, a matter of personal preference.

In Chapter 5, I outlined a formal approach to the cuneiform documentation drawing on the data structure devised by the Fragile Crescent Project. The formulated dataset has served to demonstrate the novel insights provided by structured, large-scale analyses of administrative cuneiform assemblages, in particular with regards to assessing organisational scale, subsistence preferences, nutritional benchmark values, and the characteristics of economic infrastructures within Middle Bronze Age institutional households. The time required to develop and test this data format has inhibited consideration of a number of other types of economic activity that could, naturally, provide further qualification of the arguments advanced here. Providing a thorough discussion of the infrastructures of textile production, for example, is well beyond the confinements of the present thesis, although several aspects of this industry are documented in some form in the textual record considered here. I have observed that the vast majority of subsistence resources were consumed by the institutional household (cf. 9.4), but offered no comprehensive discussion of the few pieces of evidence relating to purchase of livestock, crops, or estate. Dispersed elements of the economic infrastructure, e.g. estates held and maintained in locations often quite far from home, is another aspect that could further illustrate the relational nature of the political economy discussed earlier (10.2.4).

11.2 Further perspectives

An obvious shortcoming of the present study is the lack of a diachronic dimension. General observations advanced in preceding chapters, on the scalar discrepancy between the grain economy on the one hand and the more labour-intensive derived products, not to mention legume and fruit crop production on the other, would attain a considerably broader comparative value when viewed against historical examples from the Early and Late Bronze Ages. I have suggested in passing that such diachronic perspectives are perfectly feasible with the methodological approach formulated here, and also noted that examples discussed elsewhere in the literature, e.g. Early Bronze Age Ebla (e.g. Matthiae and Marchetti 2013), Nabada (Sallaberger and Pruß 2015), and the range of textual assemblages known from the Late Bronze Age (e.g. Postgate 2013), can be integrated within the present data structure without substantial difficulty. Expanding the present framework into an investigation of institutional household economies of the dry-farming plains over the long-term would allow us to investigate the potential environmental impact upon economic infrastructures, and also provide for a more solid empirical basis on which to assess whether or not we can observe an increase or decrease in the size of institutional economies over time. The sheer size of the cuneiform corpus, the diverse types of information that it contains, along with the spatial and temporal depth offered by a scribal tradition spanning some three millennia of human history (cf. 5.1.1) should certainly encourages such perspectives.

Appendix 1: Site biographies

The site biographies provided here constitutes, together with the text database, the empirical basis for the present study. Chapters on each study site, ordered from west to east, offer comprehensive overviews of site location and layout, available archaeological data, survey datasets, and cuneiform assemblages drawing on available publications and satellite and aerial imagery. The individual chapters are ordered under the following headings:

a) geographical location and brief historical summary
b) excavation history and principal areas of investigation
c) regional surveys and important sites within the associated micro-region
d) an overview of cuneiform assemblages and their context
e) a summary of analytical groups identified in textual assemblages

The geographical and historical summary provides an outline of the environmental context and of occupation history and trajectory with an emphasis on the Middle Bronze Age. Sections on excavation history aim to give a brief overview of archaeological findings at each study site and from related sites in the immediate hinterland. Sections on regional surveys chart first the history of survey around the study site, secondly a discussion of the historical geography pertinent to the Middle Bronze Age, and thirdly, a brief description of the micro-region established for analyses given in Chapter 9. Overviews of cuneiform assemblages define and discuss relevant textual corpora from the study site, specifically their composition, archaeological context, and historical origin. These are followed by summaries of analytical groups identified within specific assemblages and employed in analyses given in Chapters 6-9.

12 Alalah (Tell Açana)

Alalah (also Alalakh, Turkish Tell Açana and Arabic Tall al-‘Atšānah) lies on the Orontes in the southern end of the plain of Amuq, within the present-day Hatay province of Turkey. The site constitutes an elongated mound extending over some 22 ha and reaches nine metres above the surrounding plain (Figure 12.76).

Figure 12.78: Alalah (Tell Açana) from Corona 1107 (July 1969, left) and Digital Globe & Google Earth (November 2014, right)

The Amuq Plain is an alluvial basin roughly 30 by 30 km in extent entrenched between the Amanus Mountains to the northwest, the northern outlier of the Syrian Coastal Range (Jabal al-Aqra‘) to the southwest and the highlands of the Aleppo Plateau to the east. This depression forms a northern extension of the Dead Sea Transform Fault, linked to the south with the marshy trough of the Orontes and to the north with the valleys below the eastern flanks of the Amanus. After leaving the plain of al-Ghāb, the Orontes passes through a 25-kilometre long and narrow limestone gorge north of Jisr al-Šughür before entering the valley below Jabal al-Aqra’. Thence it continues north for some twenty kilometres before reaching the southern reaches of the Amuq. Here, the river skirts the southwest part of the plain running along the foot of the Jabal al-Aqra’ before turning west towards the Mediterranean. Two rivers descend onto the plain from valleys to the northeast, namely the Kara Su and the Afrin (Arabic ‘Afrīn). In pre-modern times, both rivers merged in the depression in the western part of the basin that forms the bed of the Lake of Antioch (Turkish Amik Gölü) before meeting the Orontes just east of Antakya (see e.g. the outline of the early 20th century physical environment given in Braidwood 1937). Due to intensive cultivation over the last half century, most of the plain previously taken up by the lake and surrounding marshland has now been drained. While settlement remains suggest the lake to have extended over a considerably smaller area in the Bronze and Iron Ages, the wetland riparian environment would have made for very different environmental characteristics in the past (Casana and Wilkinson 2005a, 28, also Wilkinson 1997).

The Amuq occupies a crucial waypoint between the plains of the Jazīrah, the Anatolian highlands, the inner Syrian hills and plains in the Orontes drainage, and the Mediterranean. Passes crossing the Amanus Mountain range connects the basin with the Cilician plain to the northwest and the inner ranges of Anatolia to the northeast. To the south, the Orontes provides access to the marshes of al-Ghāb and, further beyond, the plains around Himṣ, and ultimately the Biqā Valley. To the west, hardly more than a day's journey downstream, the Orontes meets the Mediterranean, following one of only three direct corridors through the coastal mountain ranges that separate inner Syria from the sea. To the east, the trough of the Afrin River leads to the Aleppo hinterland whence one reaches the Euphrates and the Jazīrah plains (Yener 2005b, 1).

Designated settlement levels at Alalah span the Middle and Late Bronze Ages, from approximately 2000 – 1200 BCE, with no later occupation (Bryce 2009, 22-24). The magnitude of the Middle and Late Bronze Age strata is to a large extent reflective of the role of Tel Tayinat just north of the site, which formed the regional centre in the Early Bronze and Iron Ages and evidently occupies the same niche within the local settlement system. Woolley's excavations recorded a total 18 occupational layers (Level XVII-0). The dating of strata below the securely dated Middle Bronze Age IIb (ca. 1700-1600 BCE) Level VII settlement has been debated. Woolley originally suggested these to be at least partly Early Bronze Age in date, but they are now generally agreed to constitute preceding phases of the Level VII structures (see discussion in Stein 1997, 56-57 with further references, also updated discussions in Yener 2005a, 101-103, Mullins 2010, 61-63). The earliest date of occupation at the site extends then no further back in time than to the end of the 3rd or the beginning of the 2nd millennium BCE (for a chronological overview, see Akkermans and Schwartz 2003, 291-296 and Fig. 299.292). The suggested presence of Chalcolithic settlement remains, buried below substantial later sediments and, further, Woolley's discovery of bevelled-rim bowls may prove to be evidence of earlier settlement levels, though this must await more conclusive investigations (Yener 2005b, 3-4, see the preliminary, but convincing arguments for dating Woolley's earliest levels to Early Bronze Age IV – Middle Bronze Age I given in Batiuk and Horowitz 2010).

Early strata, notably Level XVII-X below the principal horizontal exposures, display ceramic horizons dating to the Middle Bronze Age IIa (ca. 1800-1700 BCE), and also forerunners of the monumental complexes appearing in Level VII (Yener 2005a, 105-106). Though these levels are only exposed in soundings, the sequence of monumental structures is suggestive of the longevity and symbolic importance of the Middle Bronze Age settlement. Levels IX-VII are sub-phases of the same general period of occupation, dated to the Middle Bronze Age IIb (ca. 1700-1600 BCE) on the basis of the textual sources and associated ceramic finds (Heinz 1992, Yener 2005a, 101-102). At this time, the palatial complex of Yarim-Lim seems to have taken up much of the north and northeast sector of the mound, further illustrated by the massive city gate exposed by Woolley on the northwest slope (Yener 2005a, 105 and Fig. 104.127).

Much of the grandiose architecture of Level VII recurs in the Late Bronze Age cityscape as well. There is little in the way of coherent structural remains from Levels VI-V to match preceding or subsequent phases, but renewed constructions in the north end of the mound and general continuity in ceramic horizons suggests a vibrant settlement (Yener 2005a, 102). This is underscored by the later Level IV stratum (mid-15th to 14th century BCE), the phase that provides the most extensively documented occupational phase at Alalah (Yener 2005a, 108-110 and Fig. 104.130). The abrupt termination of this phase was followed by the most recent strata III-I, which constitute the subsequent settlement. To these belong also the imposing Hittite fortifications erected in the extreme north end above the Late Bronze Age palace environs. The ephemeral Level 0, the last phase of occupation at Alalah, came to an end in the 12th century BCE.

The Bronze Age settlement appears to have occupied the entire mound, as hinted at by recent geophysical surveys of unexcavated areas. Measurements given in the literature vary (e.g. the initial, and evidently only partial measurements in Casana and Wilkinson 2005a, 230, mostly 18-22 ha elsewhere, e.g. Woolley 1955, 5, Casana 2009, 17, Yener 2010, 1, Lawrence 2012, 259). I have maintained the figure of 19 ha given in the FCP dataset here also for the Middle Bronze Age IIb (Level VII) occupation. There is little conclusive evidence for occupation below the main mound. A dark discolouration of the fields immediately to the northeast of the mound was noted already by Woolley (1955, 132). Subsequent surface collections by the

AVRP in this area produced no unequivocal evidence of occupation, though the area does contain a sherd scatter of Bronze and post-Iron Age date (Casana and Gansell 2005, 157-158). More convincing arguments have been made for locating a lower town to the southwest given the more gentle sloping of the terrain on this side of the mound (Batiuk and Horowitz 2010, 167-168). On present evidence, the Bronze Age settlement appears to have been confined to the tell itself.

12.1 Excavation history

The site was initially surveyed by Robert Braidwood in the 1930ies and first excavated by C.L. Woolley from 1937-39 and 1946-49 (Woolley 1953, 1955). Work at the site has since been continued as part of the Amuq Valley Regional Project sponsored by the University of Chicago from 1995 to 2002 (Yener 2005b, 1). Since 2006, excavations have been jointly sponsored by the Turkish Ministry of Culture and Tourism and the Mustafa Kemal University in Antakya, and directed by K.A. Yener (Yener 2015).

The pre-war investigations began in earnest in 1937, following initial soundings made in the course of Woolley's work at Al Mina on the Mediterranean coast (Woolley 1938, 1-2). The early seasons exposed the most recent Late Bronze Age levels (Level I-III) on the central eastern side of the mound, and towards the end of the season of 1937 and throughout that of 1938, the imposing Level IV (14^{th} century BCE) palace with its extensive cuneiform assemblage further to the northwest (see Woolley 1938, 20-28, 1939, 5-18, also 1955, 110-131). A sounding made late in 1938 to investigate the levels below the Level IV gate area west of this structure reached the Level VII (17^{th} century BCE) city gate (Woolley 1939, 18-22). Textual finds from these early years related almost exclusively to the Level IV palace (preliminary summary by Smith 1939). The 1939 season saw the discovery of the Middle Bronze Age IIb palace (Level VII), located along the northeast 2^{nd} millennium BCE city wall (Woolley 1948, 8-19). The exposed part of the complex extended over some 3,000 square metres, divided into three terraced sections descending the slope of the citadel summit of the Middle Bronze Age mound from northeast to southwest (Yener 2005a, 105-106). The substantial corpus of Level VII cuneiform tablets found at Alalah derives primarily from this structure (see below).

A series of temple structures dating to Level VI-I were investigated also in 1939, and conclusively after the war, in 1946 when work at the site was reassumed (Woolley 1950, 1-2). Work in this area expanded to uncover a more or less continuous sequence of temple buildings extending from Level XVI to 0 (Woolley 1955, 33). The temple precinct lies immediately west of the Level VII palatial structure, with a square, deep cella with a narrow antechamber adjoining the western side of the palace (Yener 2005a, 106). A sounding below the Level VII monumental structures, initiated in 1946 and continued in 1947, ascertained the presence of earlier sub-phases of the Level VII palace, and eventually documented occupational phases down to Level XVII below the water table. The last two seasons prior to the termination of excavations at the site focused on the soundings and the city's fortifications (Stein 1997, 57).

Renewed excavations at Alalah were initiated with the regional investigations of the Amuq Valley Regional Project (AVRP) of the University of Chicago from 1995 to 2002. Work at the site started with an intensive survey of the mound over three seasons from 2000 to 2002. These investigations have served to precisely map out earlier work on the northern part of the mound and to survey the remaining southern end of the site and the surrounding fields (Casana and Gansell 2005). The survey further aimed to obtain a comprehensive analytical framework for understanding Woolley's interpretation of settlement phases (Batiuk and Burke 2005, Yener 2005a). Subsequent seasons commenced regular excavations. In 2003-2004, these have included independent checking of earlier excavation sequences in the vicinity of the palace precincts excavated by Woolley (Area 1), and extensive horizontal exposures on the southeast edge of the mound (Area 2 and 3). Work in the latter areas has encountered extensive craft production areas and burials dating to the Late Bronze Age (14^{th}-13^{th} century BCE) levels (Yener and Yazicioğlu 2010). Additional investigations from 2006 onwards have further complemented Woolley's monumental exposures (Area 1), and documented the extent of the Late Bronze Age occupation on the southern slope of the mound (Area 4). Recent seasons have seen more intensive excavations carried out in Area 1 to further expand upon the Level IV and VII strata.

12.2 Regional surveys

The plain of Amuq was first surveyed as part of a larger programme of archaeological investigations carried out by the Oriental Institute of Chicago from 1932-38, directed by Calvin McEwan (see Yener 2005b, 4-5, for an updated account on archaeological research in the general region and beyond, see also Yener 2010, 3-4). The project involved excavations at several major sites in the plain, notably at Tel Tayinat, a major Early Bronze and Iron Age mound less than a kilometre north of

Tel Açana (Braidwood and Braidwood 1960, 13-14), but also at several other localities. The survey component of the project was directed by Robert Braidwood. His eventual publication of the 178 sites mapped by the expedition was a pioneering study, and one of the first coherent treatments of a settlement region from the Neolithic to Islamic periods (Braidwood 1937). Renewed archaeological work by the University of Chicago from 1995 to 2002 retraced Braidwood's survey as part of an extensive programme of excavations and environmental and geomorphological investigations (Yener 2005b, 7-16). Extensive use of Corona satellite imagery and pre-war maps in conjunction with site recording and intensive transect walking added much further resolution to previous knowledge of settlement organisation within the plain, and almost doubled the number of sites mapped by Braidwood (Casana and Wilkinson 2005a). A comprehensive version of this dataset prepared by Casana (2003, see also Lawrence 2012, 249-250) has subsequently been incorporated into the FCP database, and forms the basis for the Middle Bronze Age settlement dataset reviewed here.

The Amuq Survey counted a total 70 sites with traces of Middle Bronze Age occupation across the basin (Figure 12.79). As noted by the surveyors, modern agriculture and settlement, combined with a relatively larger Iron Age overburden may substantially obscure Bronze Age layers (Casana and Wilkinson 2005b, 37-38). Settlement organisation in the Bronze Age appears to have revolved around nucleated mounded sites, which are found almost exclusively in the lowland plain. Exceptions of course appear, but are confined to widened valley floors in upland areas (Casana and Wilkinson 2005b, 38-39). While this suggests a more pronounced emphasis on mounded sites within the plain, geomorphology is bound to impact on our ability to detect single-period occupation (Yener *et al.* 2000, 168-179, also recent discussion by Lawrence 2012, 250-252). The level of sedimentation, particularly along the fringes of the surrounding mountain ranges, coupled with the oscillation of the Lake of Antioch and lateral movement of the Orontes and Afrin rivers have contributed to occasionally massive overburdens of soil that may further obscure smaller settlements on the valley floor. Isolated areas less vulnerable to sedimentation contain a higher percentage of prehistoric sites, and offer some illustration of the type of sites that are potentially underrepresented elsewhere in the plain (Casana and Wilkinson 2005b, 31).

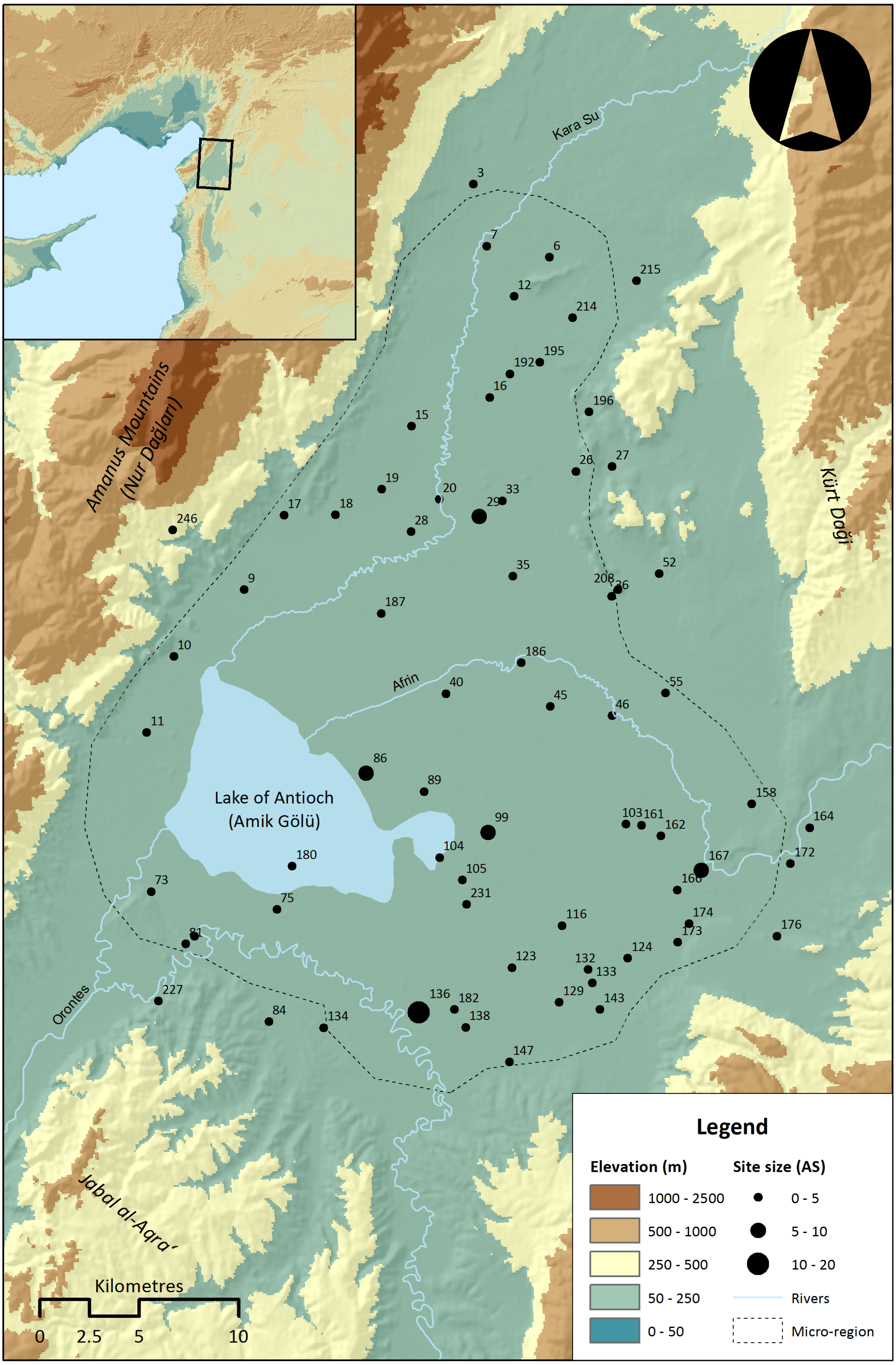


Figure 12.79: Alalah (AS 136) and associated Middle Bronze Age micro-region

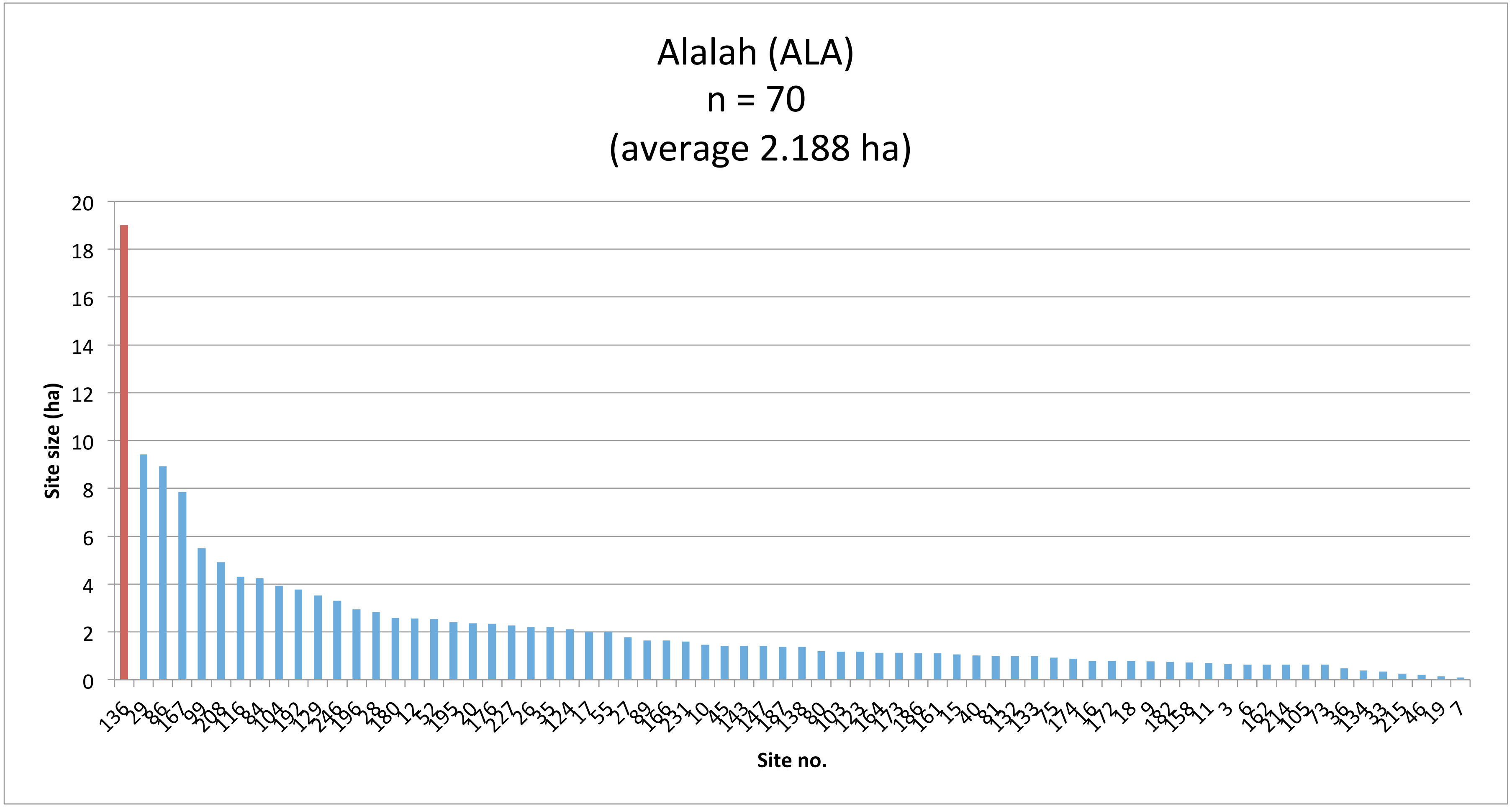


Figure 12.80: Histogram of Middle Bronze Age settlements within the Alalah micro-region

The twin mounds of Tel Tayinat (20 ha) and Açana (19 ha) are located less than a kilometre apart. Together, they form the principal settlement within the entire Amuq across the Bronze and Iron Ages, and are as such suggestive of a remarkably stable settlement organisation spanning the 4th – 1st millennia BCE (Casana and Wilkinson 2005b, 38). For the early 2nd millennium BCE, we can identify a well-articulated settlement hierarchy with the majority of sites at less than 5 ha in extent, followed by a relatively evenly distributed four local centres in the north and central part of the plain, namely Esen Tepe (AS 29) at 9.4 ha, Karatepe (AS 86) at 8.9 ha, Tall Hasanuşaği (AS 99) at 5.5 ha, and Çatal Höyuk (AS 167) at 7.8 ha. Alalah, with its 19 ha occupies the southern plain and the banks of the Orontes (Lawrence 2012, 258-260).

12.3 Textual sources

Written sources unearthed at Alalah fall in two main groups, namely one assemblage dating to the late Middle Bronze Age Level VII (ca. 1740-1625 BCE), and another from the Late Bronze Age Level IV (ca. 1400-1300 BCE). Several stray tablets and fragments have been recovered in recent excavations (cf. Lauinger 2005, 2010, 2014), but the vast majority were found by Woolley. We will concern ourselves here with epigraphic finds from Level VII only. Initially, it should be noted that proper indexing and ordering of all textual finds from Alalah is a notoriously difficult undertaking (Lauinger 2015, 37-38). Multiple discrepancies exist between excavation records, numbering systems, and the actual number of tablets and fragments retrieved (Lauinger 2011). The majority of the tablets are held in the collections of the Hatay Archaeological Museum and the British Museum, along with additional individual texts in Oxford and Australia. Archival research conducted by a variety of scholars over the last half century has sought to clarify the exact size and composition of the Level VII and, more intensively, the Level IV assemblages (for overviews, see respectively Lauinger 2015, 36-56, von Dassow 2008, 1-5).

Excavated cuneiform tablets from Woolley's excavations were first studied and catalogued by Smith (1939), while a full publication of 465 texts from all strata by Wiseman appeared later (1953). The latter index saw additional catalogue numbers appearing in two subsequent articles (Wiseman 1954, 1958), and purported to cover the excavated corpus of cuneiform tablets from all levels in its entirety (Wiseman 1954, 1). Subsequent recording of tablets in the collections of the Hatay Archaeological Museum undertaken by Dietrich and Loretz in the 1960ies documented numerous unpublished tablets. Their publication work focused exclusively on the Level IV assemblage due to the close association of these texts with contemporary material from Ugarit (Lauinger 2015, 39). While some secondary analyses of the Level VII documentation did appear in the following decades, a thorough re-edition of the corpus only came about much later, with Zeeb's critical edition of the grain disbursement records from the palace storerooms (see for a history of research up to this date Zeeb 2001, 9-25). A series of articles by Dietrich and Loretz published some years later (Dietrich and Loretz 2004, 2005, 2006) adds further to this number. Though invaluable as philological revisions of the Level VII assemblage, these publications made no attempts at clarifying the archaeological context of the tablets. The latter has been admirably elucidated by Lauinger (2007, 2011). In a recent survey, the latter author arrives at a total 285 tablets and fragments from Level VII published, with a further five tablets and fragments of an estimated 12 to 15 envelopes from the Hatay Archaeological Museum collections still awaiting publication (Lauinger 2015, 40). The bulk of these texts are administrative in nature, but the assemblage also holds a large number of legal texts, along with a few literary compositions, a letter, and a royal inscription. Texts from Level VII have formed the subject of numerous articles, yet only a few more extensive studies are concerned with the social and economic complexes evident in this material (Zeeb 2001, Lauinger 2015).

12.3.1 The Yarim-Lim Palace: Rooms 11, 12, and 13

The Level VII tablets stem from three main locations in the Level VII palace (Figure 12.81), also referred to as the Palace of Yarim-Lim (see Woolley 1955, 91-92 and Fig. 35 for an overview). The largest assemblage of cuneiform records was found in storage rooms 11, 12, and 13, a series of rooms arranged en suite and opening onto a large, central courtyard (Room 9). A list of utensils and textiles (ATaB 40.08) was found in the latter location. Of tablets with a known archaeological context, 91 whole or fragmentary administrative and 81 legal texts, along with ten envelope fragments and a letter and a literary text are associated with the three storage rooms. The administrative texts can be dated to the last three years prior to the conflagration of the palace, while the legal documentation, as observed in other archives, encompasses a somewhat longer timespan (see general discussion in Lauinger 2015, 50-56).

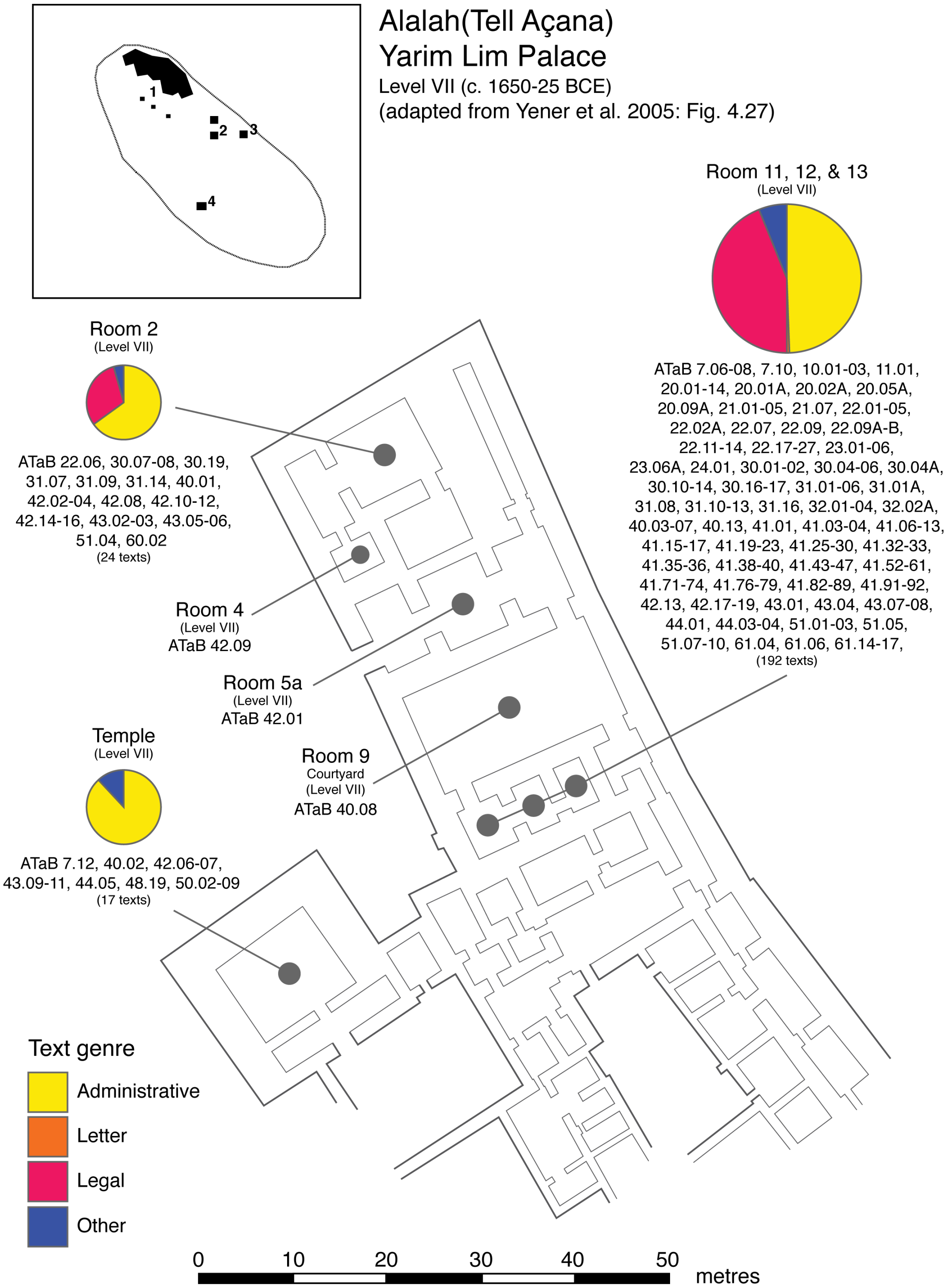


Figure 12.81: Distribution of cuneiform assemblages within the Level VII Yarim Lim Palace at Alalah

The suggestion that Rooms 11, 12, and 13 were storage rooms was made first by Wolley (Woolley 1955, 93), and seems generally accepted (Lauinger 2007, 208-210). The finding of a variety of valuable goods, among other things ivory and metals, together with the administrative tablets and the other text groups supports this assertion (also Yener 2007, 153-154). Assuming that the rooms were used to safeguard valuables, this explains the presence of legal records, all documenting ownership of various pieces of real estate, inheritance, and the like. Lauinger has argued that these texts were located in the storerooms because they, as the commodities stored alongside them, had intrinsic value. Explaining the presence of the administrative records is a different matter, but probably points to the use of these rooms for the storage of cereals, vetch, and various utensils. (Lauinger 2007, 272-277).

12.3.2 The Yarim-Lim Palace: Room 2

A smaller group of texts, numbering 24 tablets and fragments in total, were found in Room 2 further north in the structure, and concerns various commodities such as oil, wool, and livestock inventories (Lauinger 2007, 77-136). Room 2 is located behind the audience chamber (Room 5), which opens onto the main entrance way to the northern section of the palace via Room 5A (Woolley 1955, 92). A fragmentary administrative record (ATaB 42.01) was found in the latter location. An apparent herding contract concerning a small flock of cattle (ATaB 42.09) was found in the only partially excavated Room 4, which adjoined Room 2 on the west. The assemblage from Room 2 encompasses 15 administrative records and eight legal texts. Two texts (ATaB 43.02-03) relating to the receipt of oil from the town of Murar were found here, and Lauinger has proposed to relate these deliveries to the substantial number of stone vessels also found in Room 2 (Lauinger 2007, 128-129, also Lauinger 2015, 88). Others are concerned with bows (Sum. ^{giš}ban) and arrows (Sum. gi) (ATaB 42.02-04), livestock (ATaB 42.08, 42.10-12, ATaB 42.14, and ATaB 43.05-06), and wool (ATaB 42.14-16).

12.3.3 The Level VII Temple

Finally, excavated parts of the temple adjoining the palace to the west, and dedicated to the goddess Ištar, yielded a group of 15 tablets concerned exclusively with silver. This dossier comprises both receipts and disbursements, all accounting for rather small amounts (Lauinger 2007, 138-204).

12.4 Analytical groups

Text groups considered in the present study are limited primarily to the large number of disbursement records found in Rooms 11, 12, and 13.

12.4.1 Dossier (Group) ALA 1: ATaB 41.01-27 and 43.04

The dossier encompassing monthly disbursements of barley, emmer, and vetch is comprised by 28 individual texts, which demonstrate similar formal outlines and structure. 27 of these form the basis for Zeeb's important study of the Alalah Level VII palace administration (Zeeb 2001), to which is here added ATaB 43.04, a text edited and published by Dietrich and Loretz some years later (2006). The latter was excluded from Zeeb's analysis on formal grounds (Zeeb 2001, 128), yet I find the agreement in terms of recipients listed and resources issued a sufficient basis for including it here. From this dossier, three series are extrapolated according to the chronological ordering proposed by Zeeb (2001, 183). The dossier and these three series form the basis for discussions of crop regimes (7.2) and overall institutional scale (9.1.3) at Alalah. I further discuss information on livestock derived from this dossier in Chapter 8.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ALA_211_0_0	ATaB_41_02				ALA_Unknown	Damaged
ALA_212_0_0	ATaB_41_03				ALA_Palace_Room_12	Fairly complete
ALA_213_0_0	ATaB_41_04	0	7	0	ALA_Palace_Room_11	Fairly complete
ALA_214_0_0	ATaB_41_05	0	7	0	ALA_Unknown	Fairly complete
ALA_215_0_0	ATaB_41_06	0	9	0	ALA_Palace_Room_11	Fairly complete
ALA_216_0_0	ATaB_41_07				ALA_Palace_Room_11	Damaged
ALA_217_0_0	ATaB_41_08				ALA_Palace_Room_12	Damaged
ALA_218_0_0	ATaB_41_09	0	1	0	ALA_Palace_Room_12	Damaged
ALA_219_0_0	ATaB_41_10	0	1	0	ALA_Palace_Room_11	Damaged
ALA_220_0_0	ATaB_41_11				ALA_Palace_Room_11	Complete
ALA_221_0_0	ATaB_41_12	0	3	0	ALA_Palace_Room_11	Complete
ALA_222_0_0	ATaB_41_13	0	4	0	ALA_Palace_Room_11	Complete
ALA_223_0_0	ATaB_41_14				ALA_Unknown	Damaged
ALA_224_0_0	ATaB_41_15	0	6	0	ALA_Palace_Room_11	Complete
ALA_225_0_0	ATaB_41_16	0	7	0	ALA_Palace_Room_13	Damaged
ALA_226_0_0	ATaB_41_17	0	9	0	ALA_Palace_Room_11	Complete
ALA_227_0_0	ATaB_41_18	0	9	0	ALA_Unknown	Damaged
ALA_210_0_0	ATaB_41_01	0	10	0	ALA_Palace_Room_11	Complete
ALA_228_0_0	ATaB_41_19	0	12	0	ALA_Palace_Room_12	Fairly complete
ALA_229_0_0	ATaB_41_20	0	1	0	ALA_Palace_Room_11	Complete
ALA_230_0_0	ATaB_41_21	0	1	0	ALA_Palace_Room_13	Complete
ALA_231_0_0	ATaB_41_22				ALA_Palace_Room_13	Complete
ALA_232_0_0	ATaB_41_23				ALA_Palace_Room_11	Fairly complete
ALA_233_0_0	ATaB_41_24	0	6	0	ALA_Unknown	Fairly complete
ALA_234_0_0	ATaB_41_25	0	3	0	ALA_Palace_Room_11	Complete
ALA_235_0_0	ATaB_41_26	0	4	0	ALA_Palace_Room_11	Complete
ALA_236_0_0	ATaB_41_27				ALA_Palace_Room_13	Damaged
ALA_183_0_0	ATaB_43.04	0	8	0	ALA_Palace_Room_11	Fairly complete

Table 12.56: Dossier (Group) ALA 1 reference data

12.4.1.1 Series (Group) ALA 1: ATaB 41.02-09

The first series in ALA Dossier 1 counts eight texts from Zeeb's Year A (2001, 183).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ALA_211_0_0	ATaB_41_02				ALA_Unknown	Damaged
ALA_212_0_0	ATaB_41_03				ALA_Palace_Room_12	Fairly complete
ALA_213_0_0	ATaB_41_04	0	7	0	ALA_Palace_Room_11	Fairly complete
ALA_214_0_0	ATaB_41_05	0	7	0	ALA_Unknown	Fairly complete
ALA_215_0_0	ATaB_41_06	0	9	0	ALA_Palace_Room_11	Fairly complete
ALA_216_0_0	ATaB_41_07				ALA_Palace_Room_11	Damaged
ALA_217_0_0	ATaB_41_08				ALA_Palace_Room_12	Damaged
ALA_218_0_0	ATaB_41_09	0	1	0	ALA_Palace_Room_12	Damaged

Table 12.57: Series (Group) ALA 1 reference data

12.4.1.2 Series (Group) ALA 2: ATaB 41.01, 41.10-20

The second series counts twelve texts, assigned to Year B, the only series within this dossier to cover a full year.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ALA_219_0_0	ATaB_41_10	0	1	0	ALA_Palace_Room_11	Damaged
ALA_220_0_0	ATaB_41_11				ALA_Palace_Room_11	Complete
ALA_221_0_0	ATaB_41_12	0	3	0	ALA_Palace_Room_11	Complete
ALA_222_0_0	ATaB_41_13	0	4	0	ALA_Palace_Room_11	Complete
ALA_223_0_0	ATaB_41_14				ALA_Unknown	Damaged
ALA_224_0_0	ATaB_41_15	0	6	0	ALA_Palace_Room_11	Complete
ALA_225_0_0	ATaB_41_16	0	7	0	ALA_Palace_Room_13	Damaged
ALA_226_0_0	ATaB_41_17	0	8	0	ALA_Palace_Room_11	Complete
ALA_227_0_0	ATaB_41_18	0	9	0	ALA_Unknown	Damaged
ALA_210_0_0	ATaB_41_01	0	10	0	ALA_Palace_Room_11	Complete
ALA_228_0_0	ATaB_41_19	0	11	0	ALA_Palace_Room_12	Fairly complete
ALA_229_0_0	ATaB_41_20	0	12	0	ALA_Palace_Room_11	Complete

Table 12.58: Series (Group) ALA 2 reference data

12.4.1.3 Series (Group) ALA 3: ATaB 41.21-27 and 43.04

The third series is assigned to Year C and includes seven texts discussed by Zeeb, with the addition of ATaB 43.04 published by Dietrich and Loretz (2006, 115-116). The latter dates to Bala'e (the 8th month), with a belated entry for emmer expenses dated to Šatalli (the 7th month). It seems logical here to assign it to Year C, where the other seven texts span five regular and two intercalary months, terminating in months Kalma (5th) or Utithe (6th) (Zeeb 2001, 183).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ALA_230_0_0	ATaB_41_21	0	1	0	ALA_Palace_Room_13	Complete
ALA_231_0_0	ATaB_41_22				ALA_Palace_Room_13	Complete
ALA_232_0_0	ATaB_41_23				ALA_Palace_Room_11	Fairly complete
ALA_233_0_0	ATaB_41_24	0	6	0	ALA_Unknown	Fairly complete
ALA_234_0_0	ATaB_41_25	0	3	0	ALA_Palace_Room_11	Complete
ALA_235_0_0	ATaB_41_26	0	4	0	ALA_Palace_Room_11	Complete
ALA_236_0_0	ATaB_41_27				ALA_Palace_Room_13	Damaged
ALA_183_0_0	ATaB_43.04	0	8	0	ALA_Palace_Room_11	Fairly complete

Table 12.59: Series (Group) ALA 3 reference data

13 Tuttul (Tall Bīʻa)

Bronze Age Tuttul (Arabic Tall Bīʻa), is a 38 ha walled mound located west of the confluence of the Euphrates and Balīkh rivers close to the modern city of al-Raqqah. The mound sits on the crossroads of several important thoroughfares linking the Bilād al-Šām and the plains of the western Jazīrah with the Middle Euphrates Valley. In the north, the Balīkh rises in the southern end of the Harran basin and creates a passageway linking the Euphrates valley with the dry-farming plains and the Taurus foothills. Two days' journey upstream the Euphrates, a desert track leads south towards al-Riṣāfah, Neo-Assyrian Raṣappa and Roman Sergiopolis, and thence towards Tadmur (Palmyra) and ultimately Damascus and the Orontes valley around Himṣ.

Figure 13.82: Tuttul (Tall Bīʻa) from Corona 1038 (January 1967) and DigitalGlobe and Google Earth (October 2014)

The earliest archaeological remains on the site date back to the 4th millennium BCE (Krebernik and Strommenger 1998, 127). An inscribed axe-head mentions a lord of Tuttul contemporary with the mid-3rd millennium BCE archives of Ebla (Krebernik 2001, 4-7). As an important cultic centre dedicated to the deity Dagan, the city constituted one of the more important loci of political and religious power on the Middle Euphrates (Feliu 2003, 118-126). A brick inscription from the reign of Yahdun-Lim mentions "Bahlu-kullim, king of Tuttul and the land of Amnānum"[5] as partaker in an alliance against the king of Mari. A later inscription names Yahdun-Lim "king of Mari, Tuttul, and the land of Hanâ", with possible indications of administrative links to this king available from Tuttul itself (Krebernik 2001, 189). The geo-political association of Mari and Tuttul evidently had a long history, and was

[5] RIME 4 4.6.8.2 l. 70-71 ᵐba-ah-lu-ku-li-im lugal tu-tu-ul^ki ù ma-at am-na-ni-im

maintained also throughout the reigns of Šamšī-Adad, his son Yasmah-Addu, and Zimri-Lim. While archaeological evidence for occupation at the site after ca. 1400 BCE is lacking, the appearance of a city named Tuttul in Middle Assyrian sources may suggest a longer history of settlement (see also Cancik-Kirschbaum 2014, 114).

The Middle Bronze Age settlement presumably extended over the entire mound (Figure 13.82), which, when including the sizeable ramparts, covers ca. 38 ha. Initial surface collection in 1980 indicated late 3rd and early 2nd millennium BCE wares to be evenly spread across the mound, whereas earlier and later phases are more selectively distributed (Strommenger 1981, 26-27). This concurs with the apparent political importance of Tuttul in textual sources from the same periods. Apart from the 19-18th century BCE palace on Mound E, which formed the residence of consecutive governors of Yahdun-Lim and Yasmah-Addu of Mari during the period covered by the textual finds, the city also held two temples, one on the western side of the tell (Mound C), and, presumably, a principal sanctuary of Dagan on the eastern side of the palace complex (Mound F).

13.1 Excavation history

The tell has been the focus of prolonged investigations by the Deutschen Orient-Gesellschaft from 1980 under the direction of Eva Strommenger, with a temporary halt to excavations since 1995 (see for a general overview e.g. Krebernik and Strommenger 1998). Archaeological investigations at the site have focused on extensive horizontal exposures in two areas, namely a temple structure unearthed on Mound C on the western side of the site, and palace complexes on the central Mound E.

Residential housings were encountered through investigations in several areas across the site from 1980-1985, notably on Mounds B and C, but also above and north of the palace complexes on Mound E. While structures in most areas were in a rather poor state of preservation, the former two yielded a valuable exposure of Early Bronze Age houses, while the latter contained primarily traces of Late Bronze Age dwellings. Remains of Middle Bronze Age domestic structures are few and of little informative value (Miglus and Strommenger 2002, 99).

Remains of the Bronze Age ramparts and city wall were investigated over several stages from 1980-1993, on the south (Mound M), western (Mound A and C), and on the northern (Mound K) sides of the tell. Up to three gates can be identified with relative certainty (Miglus and Strommenger 2002, 9). The oldest phases of the city's fortification dates back to the first half of the 3rd millennium BCE, but there is no conclusive evidence for a Middle Bronze Age city wall (Miglus and Strommenger 2002, 21, but consider notes on investigations at Mound K, here also preliminary observations in Strommenger 1981, 33). 18th century BCE texts from the palace on Mound E make ample reference to several city gates (e.g. KTT 120).

A temple precinct was investigated on Mound C from 1981-90, and constitutes phases of an *Antentempel*-structure typical of the Early and Middle Bronze Age Jazīrah and areas further to the west (see for a basic ground plan Strommenger *et al.* 1989, Beilage 1). Surface clearing of a rectangular plateau (Mound F) east of the central Mound E has detected the broad outlines of a structure with massive mud-brick walls reminiscent of the Early and Middle Bronze Age palatial complexes, and while no extensive excavations have been carried out in this area, the excavators assume this to have been the main sanctuary of Dagan, for which, as mentioned earlier, Tuttul was widely known (Miglus and Strommenger 2002, 113-114).

The palace structures exposed on the southwest slope of Mound E date to the latter half of the 3rd millennium (Palace B) and the beginning of the 2nd millennium BCE (Palace A) respectively, the latter partly superimposed on the former. Excavated from 1983-95, almost the entire plan of Palace A has been exposed, save for the southwest corner, which was eroded away. The basic structure incorporates several phases of use (*Nutzungsniveaus*), divided into Level 0 (foundation), Level 1-2 (19th to early 18th century BCE), and Level 3-4 (c. 1890-1875 BCE) (Miglus and Strommenger 2007, 14-15). These phases can be fairly discretely linked with the cuneiform assemblage, assigning the so-called *šakkanakku*-texts dating to the reigns of the local king Bahlu-kullim and the Mari ruler Yahdun-Lim to Level 1-2, the administrative texts from the reign of Yasmah-Addu to Level 3, and a few texts from the reign of Zimri-Lim primarily, though not exclusively, to Level 4. We will return to discuss the archaeological context of these assemblages shortly.

13.2 Regional surveys

The region around Tuttul can be grossly divided into three ecological zones, namely the valley trough of the Middle Euphrates, which runs from west to east just south of the settlement, the less pronounced and narrow valley of the Balīkh that merges with the Euphrates just east of the settlement mound, and lastly the limestone terraces and the steppe above the valley troughs to the north and south.

Archaeological surveys touching on the Tuttul hinterland have generally been carried out with reference to either one of these zones, and will be summarised here in turn. Courtesy of Tuttul's prolonged association with polities at Mari, we further have a relatively extensive knowledge of the historical geography of the Tuttul hinterland.

13.2.1 The Euphrates

The valley of the Euphrates around Tuttul constitutes a wide river trough, on average c. 5 kilometres across. As discussed in Chapter 2, the river provided for a very diverse flora and fauna, probably with extensive marshes and gallery forests in addition to irrigated fields and orchards (the Arabic name of the Medieval city just west of Tall Bī'a, al-Raqqah, means 'morass', cf. Mallowan 1946, 112). The Tuttul hinterland was surveyed in relation to the German excavations at the site and the results of these undertakings have been preliminarily published (Kohlmeyer 1984, Kohlmeyer 1986). An earlier survey investigated only Palaeolithic remains along the river between al-Raqqah and Dayr al-Zūr (Besançon *et al.* 1980), while haphazard notes on a handful of settlements can be found in various accounts predating the Second World War (summarised in Kohlmeyer 1984, 96-97). The survey conducted by Kohlmeyer and colleagues was planned to cover the valley trough of the Euphrates from the al-Ṭabqah Dam downstream to Dayr al-Zūr. The present summary focuses on findings falling within a radius of some 30 kilometres from Tuttul itself.

The intensity of irrigation agriculture combined with the pronounced meandering of the Middle Euphrates are the chief reasons for the general paucity of settlements on the valley floor around Tuttul (Kohlmeyer 1984, 102-103). Some substantial individual settlements are represented, however, e.g. the prominent 12-ha Chalcolithic mound of Tall Zaydan on the eastern side of the Balīkh-Euphrates junction (see e.g. Stein 2012, for preliminary reports see Stein 2009, 2010), with tentative evidence of occupation also in the 3rd millennium BCE (Kohlmeyer 1984, 106-108). Other sites with Early Bronze Age occupation include EUS 30, with a maximum extent of 550 m across, EUS 38 on the opposite side of the river some ten kilometres upstream, and EUS 37 some eight kilometres downstream measuring 250 metres across.

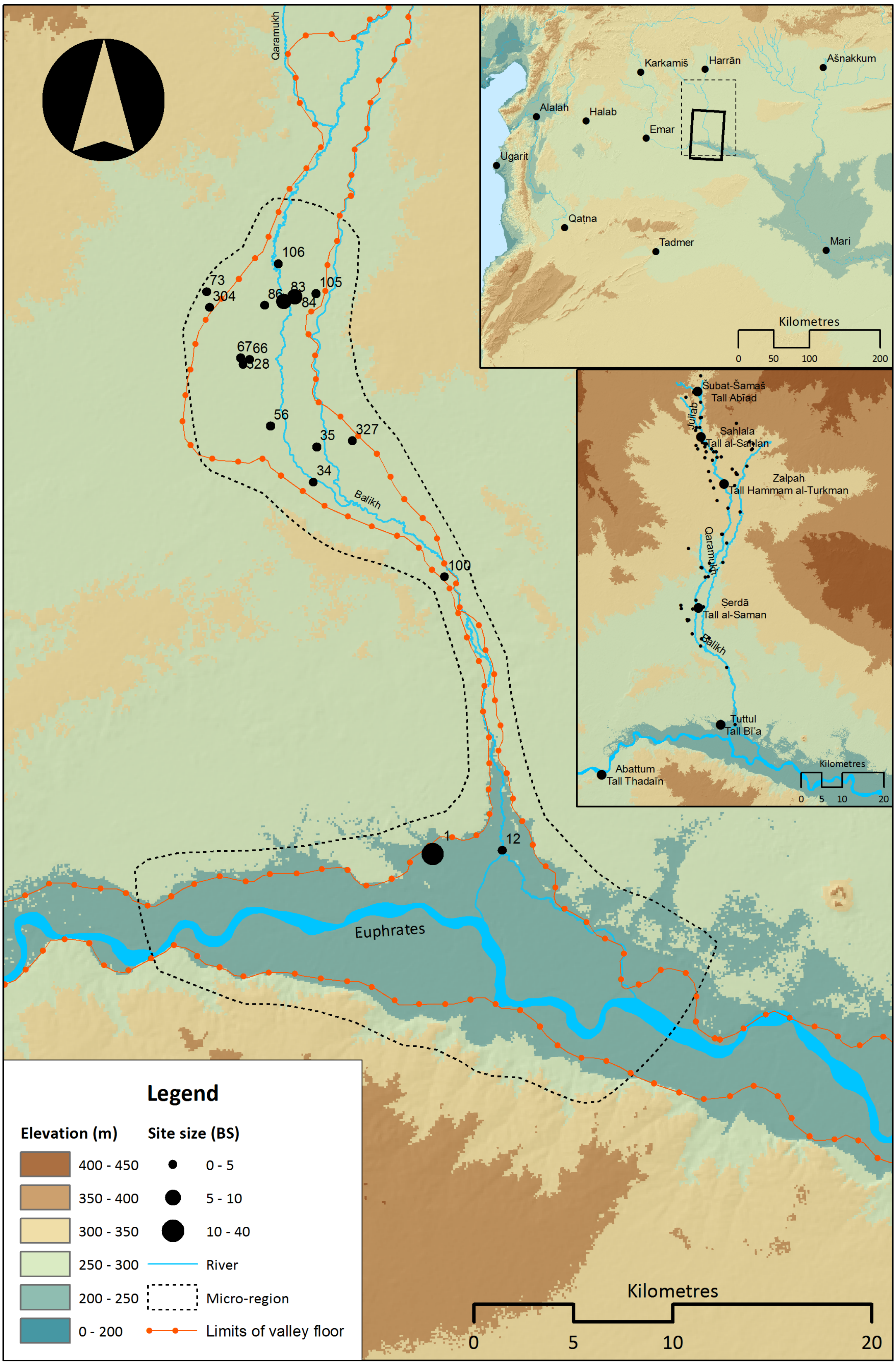


Figure 13.83: Tuttul (BS 1) and associated Middle Bronze Age micro-region. Șerdā is to be associated with either BS 83 or BS 84 (see below).

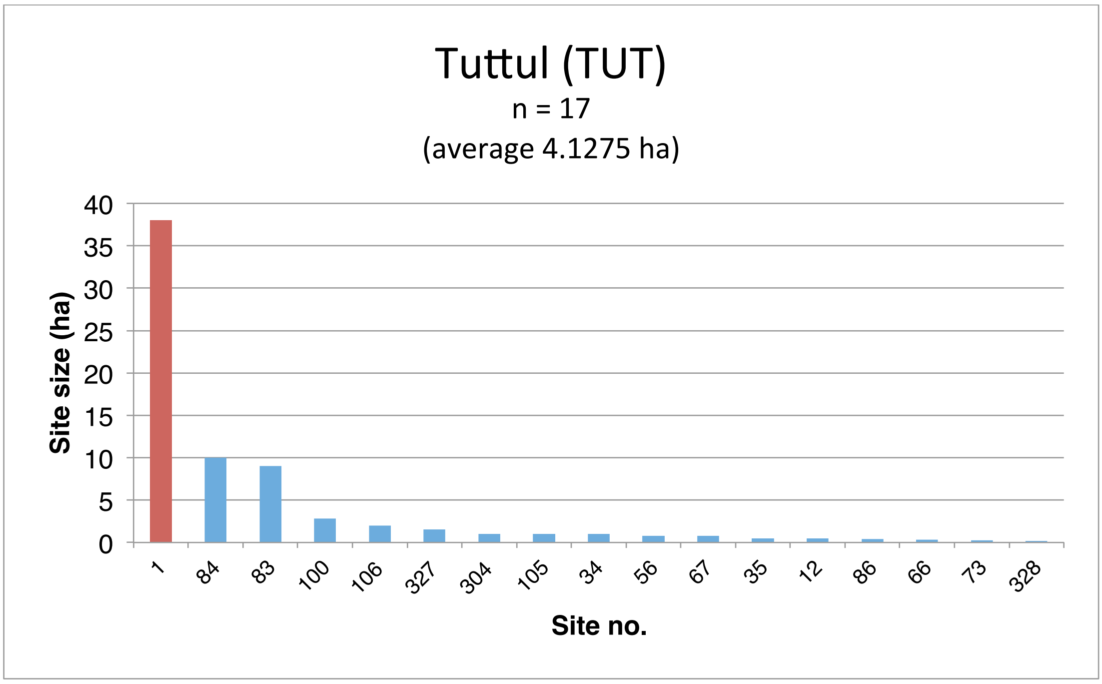


Figure 13.84: Histogram of Middle Bronze Age settlements within the Tuttul micro-region

The German survey was generally not successful in locating Middle Bronze Age settlements. Only a few sites on the Euphrates are known upstream from Tuttul, a situation possibly accentuated by Middle Bronze Age itineraries, which gives no specific stopping points, except one, for the route upstream along the river from Tuttul to Emar (Astour 1995). This one settlement, Abattum, most likely corresponds to present-day Tall Thadayin, a 22 ha mound situated on a wadi junction some 30 kilometres west of Tuttul (Kohlmeyer 1984, 112). The tell straddles the crossroads linking the Euphrates Bend and the Tuttul environs with the desert route through Rusafa to Palmyra and, ultimately, the Orontes valley and the Bilād al-Šām (for a recent historical discussion, see Ziegler 2009, 186-187). At a distance of more than a day's journey and without pertinent references in the administrative record, the latter site is too removed from Tuttul to concern us here.

13.2.2 The Upper Balīkh

The banks of the Balīkh have been extensively surveyed in the course of the last half-century following Mallowan's pre-war soundings at several sites in the upper part of the valley (Mallowan 1946, see for recent reviews Lyon 2000, 91-92, Hritz 2013a, 1976). From the karst springs at 'Aīn al-'Arūs on the Syro-Turkish border, the Balīkh runs south for some 100 kilometres to join the Euphrates at al-Raqqah. The upper half of its course leads through a relatively narrow valley fed by seasonal wadi streams on both sides. Around Tall al-Samān, the valley trough widens to a relatively large marshy basin of some 10,000 ha here termed the Samān Plain (cf.

Curvers 1991, 183). From the southeast end of this basin, the river continues through a narrow trough ca. 20 kilometres long, before discharging into the floodplain of the Euphrates east of Tuttul (Hritz 2013a, 1975). The springs at ʻAīn al-ʻArūs can be associated with Akkadian *apqū ša Baliḫa* (ʻthe sources of the Balīkhʼ) of the Old Babylonian Itinerary (Goetze 1953, 61, Hallo 1964, 77-78). The average flow of the river is low, currently around 6 m^3/s (Khater 2003, 361), and would not have allowed for riverine navigation at any point of the river's history. This also presents considerable constraints on its use in agricultural irrigation, though the stream maintains a perennial flow (Mallowan 1946, 112, Hritz 2013b, 149-150).

Pollen analysis and field observation suggest that the valley received an average 300 mm of annual precipitation above Wādī Qaramūkh, but less than 250 mm annually below this point and until the confluence with the Euphrates (Bottema and van Zeist 1981, 131). Forests of poplar and willow grew in the northern part of the valley and trees of some abundance around Tuttul are alluded to in texts from the Middle Bronze Age (Krebernik 2001, 12 with further references). In the valley north of Tall Hammam al-Turkman, geological composition indicates the presence in antiquity of waterlogged areas, presumably marshes extending over parts of the valley floor (Hritz 2013b, 154). While set in an arid environment, the river allowed for the irrigation of wheat crops, as seen e.g. in the Chalcolithic (Hart 2014, 108-110), and in the Middle and Late Bronze Ages (for Tuttul, see Krebernik 2001, 13, for Middle Assyrian Ṣabī Abīaḍ, see e.g. Wiggermann 2000, 178).

13.2.2.1 Tall Abīaḍ and the location of Šubat-Šamaš

The location of Šubat-Šamaš, a settlement and administrative centre of explicit importance for the kingdom of Šamšī-Adad during the earlier part of the 18th century BCE, remains unknown, but should be briefly considered here. It seems reasonably clear that it must be located north of Zalpah, and therefore at least around Tall al-Sahlan (Sahlala in the Old Babylonian Itinerary, cf. Hallo 1964, 78). Charpin and Durand suggested Tall Abīad (Charpin and Durand 1986, 183), further supported by the occasional association of Šubat-Šamaš with the region of Zalmaqum, probably a Middle Bronze Age name for the Harran Plain (Wu 1992, 50, also Durand 1988). Following a hypothesis advanced by Otto and Einwag, recent historical surveys of pertinent sources from Mari have proposed Tall Bandar Khān, some 25 km west of Tall Abīaḍ, which sits on a thoroughfare connecting the basins of Harran and Saruj (Ziegler 2009, 206-207, also Arkhipov 2014, 268).

To this we may add some environmental information; in the letter ARM 1, 118, allusions are made to pasturing cattle in the environs of Šubat-Šamaš, supposedly numbering around 1,200 head. As the cattle tags from Tuttul, relating to the same economic enterprise, lend support to a number in this range (see Chapter 9: Lands of Pasture), there is little reason to doubt its validity. Such a number of pasturing livestock would require relatively extensive tracts of pasture (for 1200 head of cattle up towards 2500 ha), which would favour a location of Šubat-Šamaš proximal to the basin around Harran, where good pasture would be readily available. This is hardly a conclusive argument, however, and the association of Šubat-Šamaš with Tall Abīaḍ adopted here should be considered an educated guess.

13.2.2.2 Zalpah (Tall Hammam al-Turkman)

Some 30 kilometres south of ʻAīn al-ʻArūs, the valley of the Balīkh widens into a relatively spacious expanse, fed on the eastern side by smaller seasonal tributaries. This stretch of the valley was able to produce substantial agricultural returns in the Late Bronze Age (Wiggermann 2000, 180-181). As noted by Hritz, an increasing number of small sites appear in this area during the Middle Bronze Age, with archaeological finds suggestive of a diversified economy relying both on agriculture, pastoralism, and exploitation of wetland resources (Hritz 2013b, 155). During this time, the principal settlement was the 10-ha Tall Hammam al-Turkman, a high, conical mound on the western edge of the valley floor. Given its size and prominent location on the river, this site is generally thought to be Middle Bronze Age Zalpah, a settlement amply mentioned in Mari sources and also in the Old Babylonian Itinerary (e.g. van Loon and Meijer 1988, xxv-xxvi, Córdoba 1990, 362-363 and Fig. 361). According to a Mari letter, authorities at Zalpah exercised control of the flow of the Balīkh, a situation that impacted heavily on settlements further downstream, namely around Ṣerdā and Ahuna (Villard 1987). Drawing on calculations of the base flow of the Balīkh, Wilkinson has underscored the strain on available surface water presented by estimated Middle Bronze Age population figures for the region (Wilkinson 1998, 64-65 and 79-82).

13.2.3 The Lower Balīkh and the Samān Plain

Available settlement data from the Early and Middle Bronze Age suggest a division of the Balīkh Valley into two primary social regions, separated by a much less densely settled corridor between Tall al-Samān in the south and Hammam al-Turkman further north (e.g. Curvers 1991, 198, Wilkinson 1998, 71, see now the important discussion by Koliński 2014c, 189-198 and 205). It is worth noting that this division may be appearing also in Middle Bronze Age epistolary sources relating to water management (see above). Below Wādī Qaramūkh, the trough of the Balīkh widens to form a relatively wide marshy expanse, the Samān Plain. Out of some fifteen attested Middle Bronze Age settlements in this area, only two rise above hamlet size. These are the twinned sites of BS 83 (Tall al-Samān) and 84, which sit on either side of the Balīkh in the northern part of the Samān Plain, extending over nine and ten hectares respectively. We will examine this area in some detail, as it is very likely to constitute the immediate agricultural basis of the town of Ṣerdā, a local centre figuring prominently in administrative records from Tuttul.

13.2.3.1 Ṣerdā and Ahuna

Two toponyms appear in association with the Tuttul hinterland with particular regularity, namely Ṣerdā and Ahuna. Both appear as stations between Zalpah and Tuttul in the Old Babylonian Itinerary (Ṣerdā on the outbound leg, Ahuna, in the same position, on the homebound leg) and should thus be sought in the Samān Plain. Ṣerdā in particular is important here, as it appears as a collection point for parts of the grain harvest accounted for in KTT 120, and similarly as a storage facility for grain in KTT 116 (see comments in Krebernik 2001, 195-196). While appearing regularly in Mari texts, Ahuna seems less central to managerial infrastructures at Tuttul.

Ahuna has been identified with Tall al-Samān (BS 83) by Córdoba. The same author suggested Ṣerdā to be modern Tall al-Sidda based on the similarity of the ancient and modern names (Córdoba 1990, 376-377). Córdoba provides no coordinates for Tall al-Sidda, but as he refers to it as located 'eineinhalb Kilometer entfernt in südöstlicher Richtung' from Tall al-Samān (Córdoba 1990, 368), I assume that this corresponds with the Tall al-Samān al-Šarqi, or a location very close to it. Despite repeated investigations of settlement patterns in the Balīkh, Tall al-Sidda has not been systematically surveyed, and Córdoba's own investigations produced only Iron Age and Hellenistic pottery, with no indication of Bronze Age remains (note that Otto, in a recent review, apparently mistakes Córdoba's Tall al-Sidda for BS 84, cf. Otto 2009, 172). BS-106 (Curvers 1991, 186) lies on the main arm of the river some four kilometres northwest of al-Sidda and around two kilometres northwest of Tall al-Samān and could be another candidate, yet its Bronze Age settlement, though different numbers appear in the literature, is suggested to be only around 2 ha (Curvers 1991, 186, Hritz 2013b, 146). BS-105, though comprising an extensive sherd scatter some 350x350 metres in extent, is similarly estimated at a mere 1 ha for the Balīkh VIIB phase (Curvers 1991, 186).

If considering settlement size to be a qualified variable for determining the location of Ṣerdā, the dual tells of BS 83 (Tall al-Samān) and BS 84 are, strictly speaking, the only site of some significance within the plain (also tentatively proposed by Otto 2009, 172). No other site in the immediate vicinity with material remains dated to this period rises above the level of a mere hamlet. A more secure location for Ahuna cannot be provided here, but it should be noted that this toponym is, in any case, a fairly generic term ('separate', an abstract of Akkadian *ahu*, which means 'brother' or 'side'), and so may be hard to identify (see e.g. the discussion of Late Bronze Age historical geography in the same area by Yamada 2011, 200).

13.2.4 The Jazīrah

Beyond the valley troughs, the Tuttul micro-region is surrounded by the dry steppe of the Jazīrah occupying the void eastward to the Khabūr River and westward, to the Euphrates north of the bend. While subjected to a high level of annual precipitation variability, the upper reaches of this plain could have sustained marginal barley cultivation, but their primary use, in particular around Ṣerdā and Tuttul, would have been as pasture for sheep and goat (Wilkinson 1998, 10 and Fig. 16). Archaeological survey further west, in the upland regions around Tall Suwayhat, has identified several ephemeral settlements that could have served as pastoral encampments (Danti 2000, 279-280). Non-intensive surveys covering the steppe to the east and west of the Balīkh Valley are available, but have not touched on Middle Bronze Age settlements within the immediate environs of Tuttul and Ṣerdā. Einwag investigated the plain south of the Saruj and Harran Basins towards the Euphrates, including the banks of the Wādī Qaramūkh (Einwag 1993). To the east, the work of Hole and Kouchokos covers the land around the Jabal 'Abd al-'Azīz, too distant to concern us here (Hole 1997, 1998, Kouchokos 1998).

13.3 Textual sources

Turning to consider textual finds from Tuttul, all recorded cuneiform tablets found derive from the palatial structure excavated on Mound E (Palace A). Two exceptions should be noted. A stray tablet was found on the surface of Mound T, just east of the supposed Dagan temple precinct on Mound F, and encouragingly enough mentioning silver for the temple of Dagan (KTT 349, with discussion by Krebernik 2001, 148-149). Another, recovered during surface inspections in 1980, stems from the slope of Mound E, and accounts for a large amount of grain rations issued in mid-winter to cattle herders (KTT 176, cf. Krebernik 2001, 106-107). The cuneiform assemblage from Palace A includes a total 377 texts, dockets, and envelopes, distributed across a period spanning the late 19th to the first quarter of the 18th century BCE. These were found mainly in a series of interrelated rooms in the northeast part of Palace A (Krebernik 2001, 15). Three texts, namely KTT 299 and 381-382 could not be assigned to a meaningful context here. As the assemblage from Palace A derives from heavily disturbed contexts (most tablets were found used as fill or in stamped floors), the distribution maps given below collapses the archaeological sequence into Level 1-2 (Figure 13.85) and 3-4 (Figure 13.86) respectively.

13.3.1.1 Level 1-2: Texts from the reigns of Bahlu-kullim and Yahdun-Lim

A hoard of 47 administrative texts and one letter (KTT 4-20 and 25-55) were recovered from the lot Bi.29/50,151, found on a walking surface outside the northeast part of the palace structure (Krebernik 2001, 15). This group comprises a set of personnel lists (KTT 4-20) accounts of livestock (KTT 25-51), various other items (KTT 52-54) and a letter (KTT 55). Together with four administrative texts from the interior of the palace, namely a stray group of grain disbursements from Level 1 found in the southern part of Courtyard B (KTT 22-24) and a list of people (KTT 21) from Room H in the western wing, in a Level 4 context (Miglus and Strommenger 2007, 46-47), this completes the 52 texts dating to Level 1 and 2. The spatial distribution of these is given in the table below.

13.3.1.2 Level 3-4: Administrative texts from the Kingdom of Upper Mesopotamia

The bulk of cuneiform records retrieved from Palace A derives from the local administration subordinate to Yasmah-Addu of Mari and his father, Šamšī-Adad at Šubat-Enlil. Chronologically, these span the eponymal years from Ibni-Adad (REL 186) to Ṭāb-ṣilli-Aššur (REL 197), thus 1787-1776 BCE. This assemblage is intermixed with a few texts dating to the first years of Zimri-Lim’s reign. Since the general make-up of the archaeological context is admittedly complicated and suggestive of a diffused and secondary nature of deposition, we will limit ourselves here to point out a couple of distinctive dossiers.

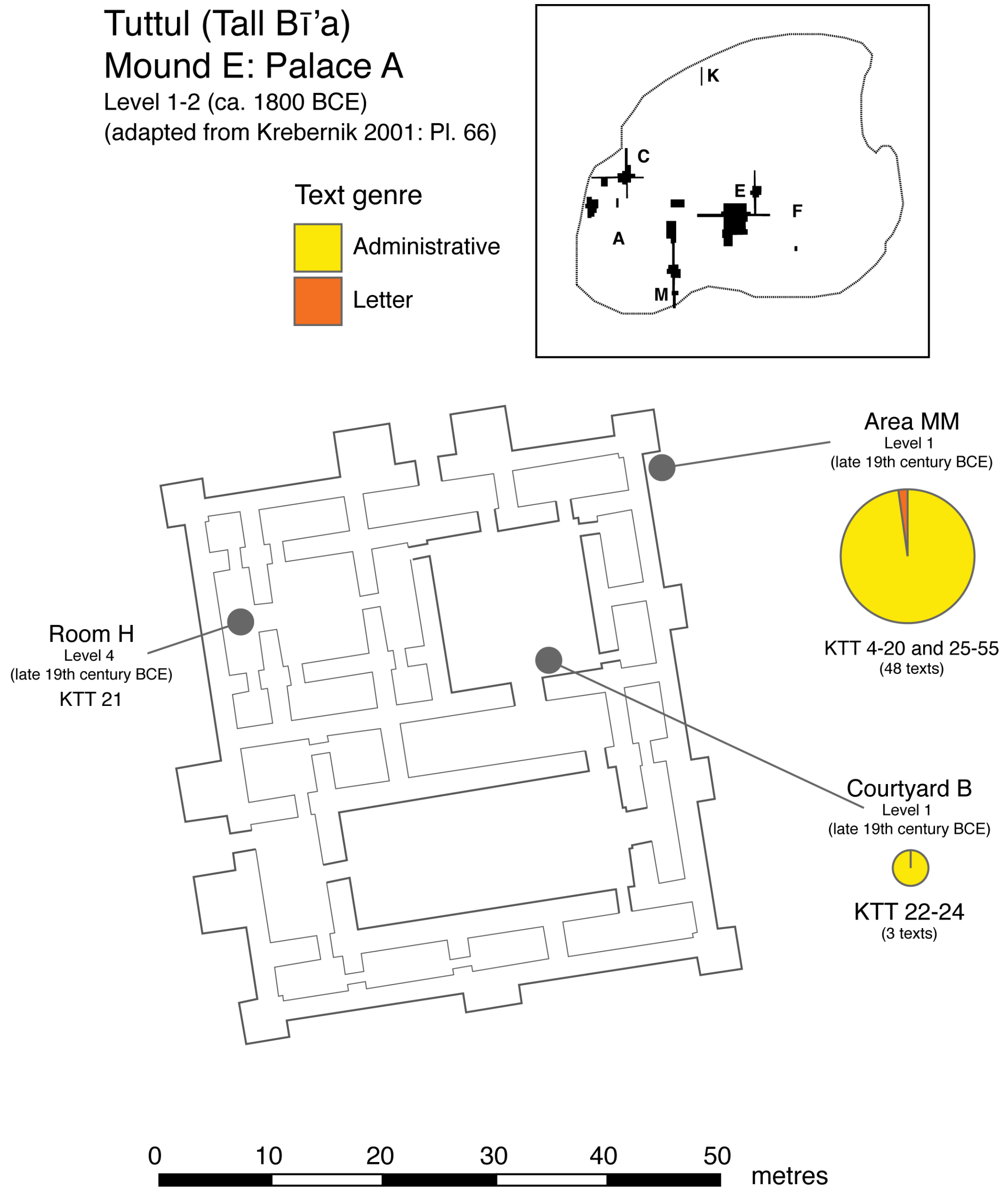


Figure 13.85: Distribution of cuneiform assemblages from Palace A Level 1-2 (c. 1800 BCE)

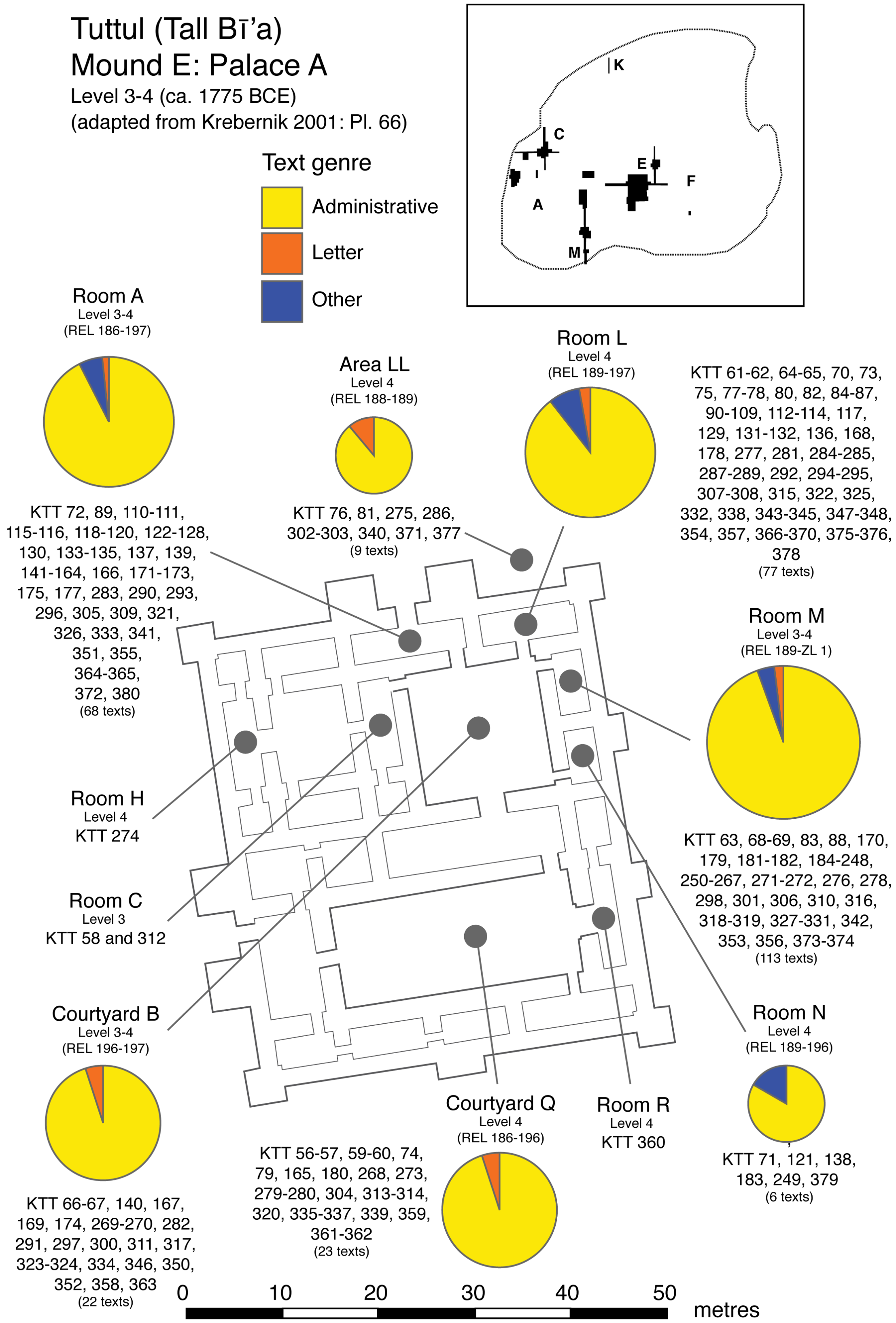


Figure 13.86: Distribution of cuneiform assemblages from Palace A Level 3-4 (c. 1775 BCE)

68 texts, of which 63 are administrative in nature, were found in various locations in Room A, and contain information mainly on cereals, but also flour and beer, animals, and a few other commodities. Similar matters are found in the 77 texts retrieved from Room L, deriving from two main hoards and numerous smaller

scatters (cf. Krebernik 2001, Plate 66). Out of the latter group, 68 are administrative texts, and refer to much the same range of cereals, subsistence commodities, and animals as the texts from Room A, though we should note here the dossier of disbursements for messengers (TUT Dossier 1).

The largest group of texts from Level 3-4 comes from Room M, and numbers a total 113 texts, of which 107 are administrative. A group of 84 cattle tags (KTT 183-266), documenting the loss of cattle in the care of herders, derives primarily from this location (namely KTT 184-248 and 250-266) (Miglus and Strommenger 2007, 27-28). A further two tags from this dossier (KTT 183 and 249) stem from Room N (lot Bi.28/50, 134) (Miglus and Strommenger 2007, 34).

13.4 Analytical groups

As discussed above, archaeological context and assemblage composition both suggest text groups from Palace A to derive from dispersed secondary contexts, either discarded or used in structural fill. This generates some problems in the extrapolation of analytical series, which are often relatively small or made up of rather incoherent chronological segments. Analytical groups utilised in the present study relate primarily to cereal products and disbursements of flour and bread, but there are also interesting assemblages on livestock, namely birds and cattle.

13.4.1 Series (Group) TUT 1: Flour allotments

This series is comprised by seven texts concerning flour allotments for a group of up to 40 people, namely KTT 121, 136, 167, 296-299 (discussed by Krebernik 2001, 196-198). It constitutes one of the few extensive sets of documentation on the disbursement of flour and bread to a larger group of named individuals within the general dataset. The texts concern a variable number of recipients, several of which are attested elsewhere in supervisory roles and may tentatively be understood as forming part of the managerial stratum of the institutional household (Krebernik 2001, 196). Based on the summary given at the end of KTT 296, we can deduce that the texts concern issues of barley flour (Sum. zid2-še) and powdered flour (Sum. zid2-gu), but it is not possible to securely assign these types to individual entries. The series is discussed in relation to consumption of processed cereal products in Chapter 6.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
TUT_121_0_0	KTT_121	2	3	196	PLA_Room_N_L4	Fairly complete
TUT_136_0_0	KTT_136		6	196	PLA_Room_L_L4	Damaged
TUT_167_0_0	KTT_167	17	12	196	PLA_Courtyard_B_L3	Damaged
TUT_296_0_0	KTT_296				PLA_Room_A_L4	Damaged
TUT_297_0_0	KTT_297				PLA_Courtyard_B_L4	Fairly complete
TUT_298_0_0	KTT_298				PLA_Room_M_L3	Damaged
TUT_299_0_0	KTT_299				PLA_Unknown	Damaged

Table 13.60:Series (Group) TUT 1 reference data

13.4.2 Series (Group) TUT 2: Fodder for birds

This series includes three texts accounting for barley fodder disbursed for birds, namely KTT 155, 163, and 164, primarily geese, but also other types of water fowl. In formal terms, KTT 155 and the extensively damaged KTT 163 are clearly related, whereas KTT 164 does not explicitly refer to the listed birds as ‘decoys’ (Akk. *arru*). The overall number of birds recorded lies within the same range, however. The series is discussed in relation to birdkeeping (8.5).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
TUT_155_0_0	KTT_155	30	7	196	PLA_Room_A_L4	Complete
TUT_163_0_0	KTT_163	30	8	196	PLA_Room_A_L4	Damaged
TUT_164_0_0	KTT_164	30	8	196	PLA_Room_A_L4	Fairly complete

Table 13.61: Series (Group) TUT 2 reference data

13.4.3 Series (Group) TUT 3: Fodder for the fattening house

The series counts two texts recording fodder issued for a fattening house at Tuttul, primarily for rams, but also a substantial number of cattle. The series is discussed in 8.7 along with very similar examples from Ašnakkum.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
TUT_151_0_0	KTT_151	30	7	196	PLA_Room_A_L4	Fairly complete
TUT_161_0_0	KTT_161	30	8	196	PLA_Room_A_L4	Complete

Table 13.62: Series (Group) TUT 3 reference data

13.4.4 Dossier (Group) TUT 1: Allotments to travellers

This dossier includes a diverse group of records concerning disbursements of allotments and provisions for messengers passing through the city on their way to or from the Middle Euphrates Valley. All 18 records date to the year of Awiliya (REL 194, or 1779 BCE). They are of interest here mainly with regards to the information provided on standard sizes of grain, flour, bread and beer for daily consumption, and consequently are discussed in relation to the consumption of cereal products in Chapter 6.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
TUT_85_0_0	KTT_085		1	194	PLA_Room_L_L4	Damaged
TUT_87_0_0	KTT_087	15	8	194	PLA_Room_L_L4	Damaged
TUT_91_0_0	KTT_091	24	9	194	PLA_Room_L_L4	Complete
TUT_92_0_0	KTT_092	29	9	194	PLA_Room_L_L4	Complete
TUT_93_0_0	KTT_093	7	10	194	PLA_Room_L_L4	Fairly complete
TUT_94_0_0	KTT_094	7	10	194	PLA_Room_L_L4	Complete
TUT_95_0_0	KTT_095	9	10	194	PLA_Room_L_L4	Damaged
TUT_96_0_0	KTT_096	13	10	194	PLA_Room_L_L4	Damaged
TUT_97_0_0	KTT_097	14	10	194	PLA_Room_L_L4	Complete
TUT_98_0_0	KTT_098	15	10	194	PLA_Room_L_L4	Damaged
TUT_99_0_0	KTT_099	17	10	194	PLA_Room_L_L4	Complete
TUT_100_0_0	KTT_100	22	10	194	PLA_Room_L_L4	Damaged
TUT_101_0_0	KTT_101	30	10	194	PLA_Room_L_L4	Fairly complete
TUT_103_0_0	KTT_103	24	11	194	PLA_Room_L_L4	Damaged
TUT_106_0_0	KTT_106	30	11	194	PLA_Room_L_L4	Complete
TUT_107_0_0	KTT_107	5	12	194	PLA_Room_L_L4	Damaged
TUT_108_0_0	KTT_108	14	12	194	PLA_Room_L_L4	Complete
TUT_109_0_0	KTT_109	20	12	194	PLA_Room_L_L4	Damaged

Table 13.63: Dossier (Group) TUT 1 reference data

13.4.5 Dossier (Group) TUT 2: Cattle tags

This dossier comprises a group of 79 texts (KTT 188-266) documenting dead cows and calves, each made out to ascertain that the responsible shepherd (Sum. na-gada) was not liable for the loss (a general discussion of this practice is given in Postgate 1975, 6-7, also Krebernik 2001, 111-112). According to a docket associated with the tags, the dossier related to ‘cows with the shepherds of Sîn-tiri’ (KTT 267), and so is likely linked to livestock discussed in the letter ARM 1, Text 118 (also Rattenborg 2012, 69-70, for a brief discussion of similar types of documentation relating to sheep herders, see van de Mieroop 1993, 166-168). The tags were made out on set dates, reflecting a post hoc managerial accounting rather than a record of the actual date of loss (Heimpel 2003b, 320-321). The dossier is discussed in 8.1 in relation to cattle management.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
TUT_188_0_0	KTT_188	4	6	189	PLA_Room_M_L3	Damaged
TUT_189_0_0	KTT_189	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_190_0_0	KTT_190	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_191_0_0	KTT_191	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_192_0_0	KTT_192	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_193_0_0	KTT_193	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_194_0_0	KTT_194	4	6	189	PLA_Room_M_L3	Fairly complete
TUT_195_0_0	KTT_195	4	6	189	PLA_Room_M_L3	Complete
TUT_196_0_0	KTT_196	4	6	189	PLA_Room_M_L3	Damaged

TUT_197_0_0	KTT_197	4	6	189	PLA_Room_M_L3	Damaged
TUT_198_0_0	KTT_198	4	6	189	PLA_Room_M_L3	Damaged
TUT_199_0_0	KTT_199	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_200_0_0	KTT_200	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_201_0_0	KTT_201	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_202_0_0	KTT_202	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_203_0_0	KTT_203	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_204_0_0	KTT_204	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_205_0_0	KTT_205	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_206_0_0	KTT_206	27	8	189	PLA_Room_M_L3	Damaged
TUT_207_0_0	KTT_207	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_208_0_0	KTT_208	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_209_0_0	KTT_209	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_210_0_0	KTT_210	27	8	189	PLA_Room_M_L3	Complete
TUT_211_0_0	KTT_211	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_212_0_0	KTT_212	27	8	189	PLA_Room_M_L3	Damaged
TUT_213_0_0	KTT_213	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_214_0_0	KTT_214	27	8	189	PLA_Room_M_L3	Damaged
TUT_215_0_0	KTT_215	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_216_0_0	KTT_216	27	8	189	PLA_Room_M_L3	Complete
TUT_217_0_0	KTT_217	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_218_0_0	KTT_218	27	8	189	PLA_Room_M_L3	Complete
TUT_219_0_0	KTT_219	27	8	189	PLA_Room_M_L3	Damaged
TUT_220_0_0	KTT_220	27	8	189	PLA_Room_M_L3	Fairly complete
TUT_221_0_0	KTT_221	27	8	189	PLA_Room_M_L3	Damaged
TUT_222_0_0	KTT_222	27	8	189	PLA_Room_M_L3	Damaged
TUT_223_0_0	KTT_223	27	8	189	PLA_Room_M_L3	Damaged
TUT_224_0_0	KTT_224	27	8	189	PLA_Room_M_L3	Damaged
TUT_225_0_0	KTT_225	27	8	189	PLA_Room_M_L3	Damaged
TUT_226_0_0	KTT_226	27	8	189	PLA_Room_M_L3	Damaged
TUT_227_0_0	KTT_227	27	8	189	PLA_Room_M_L3	Damaged
TUT_228_0_0	KTT_228	27	8	189	PLA_Room_M_L3	Damaged
TUT_229_0_0	KTT_229	27	8	189	PLA_Room_M_L3	Damaged
TUT_230_0_0	KTT_230	27	8	189	PLA_Room_M_L3	Damaged
TUT_231_0_0	KTT_231	27	8	189	PLA_Room_M_L3	Damaged
TUT_232_0_0	KTT_232	27	8	189	PLA_Room_M_L3	Damaged
TUT_233_0_0	KTT_233	27	8	189	PLA_Room_M_L3	Damaged
TUT_234_0_0	KTT_234			189	PLA_Room_M_L3	Damaged
TUT_235_0_0	KTT_235			189	PLA_Room_M_L3	Damaged
TUT_236_0_0	KTT_236	15	2	190	PLA_Room_M_L3	Complete
TUT_237_0_0	KTT_237	15	2	190	PLA_Room_M_L3	Fairly complete
TUT_238_0_0	KTT_238	15	2	190	PLA_Room_M_L3	Complete
TUT_239_0_0	KTT_239	15	2	190	PLA_Room_M_L3	Complete
TUT_240_0_0	KTT_240	15	2	190	PLA_Room_M_L3	Complete
TUT_241_0_0	KTT_241	15	2	190	PLA_Room_M_L3	Fairly complete
TUT_242_0_0	KTT_242	15	2	190	PLA_Room_M_L3	Complete
TUT_243_0_0	KTT_243	15	2	190	PLA_Room_M_L3	Fairly complete
TUT_244_0_0	KTT_244	15	2	190	PLA_Room_M_L3	Damaged
TUT_245_0_0	KTT_245	15	2	190	PLA_Room_M_L3	Damaged

TUT_246_0_0	KTT_246		3	190	PLA_Room_M_L3	Fairly complete
TUT_247_0_0	KTT_247	26	8	190	PLA_Room_M_L3	Damaged
TUT_248_0_0	KTT_248	26	8	190	PLA_Room_M_L3	Damaged
TUT_249_0_0	KTT_249			190	PLA_Room_N_L4	Damaged
TUT_250_0_0	KTT_250	0	6	193	PLA_Room_M_L3	Fairly complete
TUT_251_0_0	KTT_251	0	6	193	PLA_Room_M_L3	Damaged
TUT_252_0_0	KTT_252		6	193	PLA_Room_M_L3	Damaged
TUT_253_0_0	KTT_253				PLA_Room_M_L3	Damaged
TUT_254_0_0	KTT_254				PLA_Room_M_L3	Damaged
TUT_255_0_0	KTT_255				PLA_Room_M_L3	Damaged
TUT_256_0_0	KTT_256				PLA_Room_M_L3	Damaged
TUT_257_0_0	KTT_257				PLA_Room_M_L3	Damaged
TUT_258_0_0	KTT_258				PLA_Room_M_L3	Damaged
TUT_259_0_0	KTT_259				PLA_Room_M_L3	Damaged
TUT_260_0_0	KTT_260				PLA_Room_M_L3	Damaged
TUT_261_0_0	KTT_261				PLA_Room_M_L3	Damaged
TUT_262_0_0	KTT_262				PLA_Room_M_L3	Damaged
TUT_263_0_0	KTT_263				PLA_Room_M_L3	Damaged
TUT_264_0_0	KTT_264				PLA_Room_M_L3	Damaged
TUT_265_0_0	KTT_265				PLA_Room_M_L3	Damaged
TUT_266_0_0	KTT_266				PLA_Room_M_L3	Damaged

Table 13.64: Dossier (Group) TUT 2 reference data

14 Ašnakkum (Tall Šāghir Bāzār)

Middle Bronze Age Ašnakkum (Arabic Tall Šāghir Bāzār or Chagar Bazar) lies in the central part of the Khabūr Plain, on the west bank of the Wādī Khanzīr ('Pig River', also Wādī Amuda or Wādī Dara). The mound extends over a total 12 hectares, and reaches 21 metres above the plain at its highest point. Situated at the intersection of several major routes across the plains, notably on the road between Hasakah and Amuda, its location bears testimony to the importance of the settlement that it once housed (Mallowan 1937, 92-93, Curtis 1982, 79).

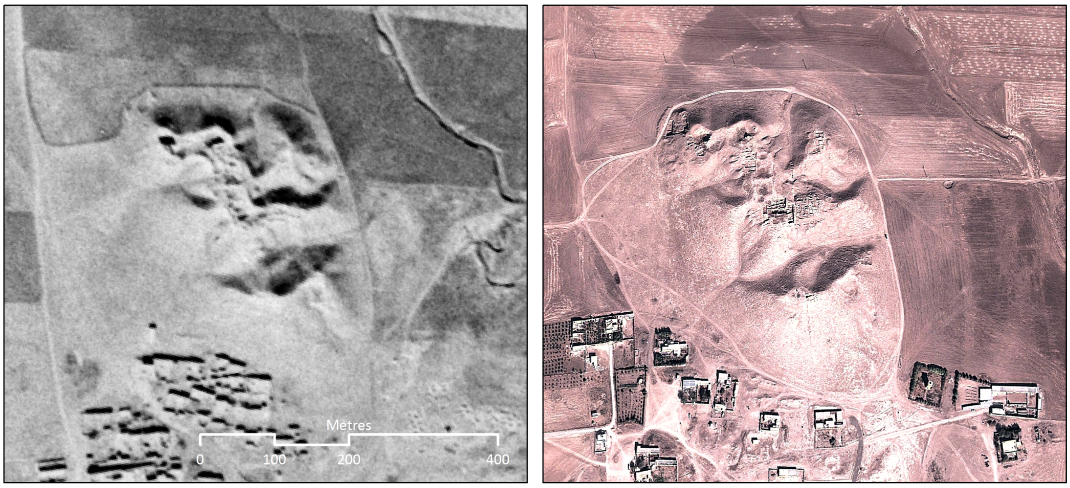


Figure 14.87: Ašnakkum (Tall Šāghir Bāzār) from Corona 1105 (November 1968) and DigitalGlobe and Google Earth (November 2010)

The environs of the settlement traverses the Taurus foothills, rising only some 50 kilometres to the north, the open grassland of the basin itself, and the basalt fields and the drier steppe further south where the wadis meet the Khabūr River (McMahon 2009, 15). Comparable landscape elements can be found around Šehnā a few days' journey to the east. Ašnakkum itself receives an average 300 mm of rain annually, while areas further north and south may display significantly higher or lower levels of precipitation. The hinterland thus offered good but potentially variable, opportunities for dryfarming, along with good pasture for livestock. Though water flow in the streams descending onto the plain from the Tur Abdin may be either seasonal or highly variable, the Khabūr River feeds on karst springs emanating at Raṣ al-'Aīn, and is thus a perennial source of water. The history of occupation of Ašnakkum extends from the Halaf to the Late Bronze Age (ca. 6000-1500 BCE), with continuous settlement first until the end of the Early Bronze Age, followed by a hiatus in the beginning of the 2nd millennium BCE (recently discussed by Koliński 2014a, 31). More dispersed traces of occupation can be found in later periods, until the site was abandoned around 1500 BCE (McMahon 2009, 19-28). The site seems to have reached its maximum extent already during the initial period of settlement, maintained perhaps towards the end of the Early Bronze Age. In the Middle Bronze Age, McMahon suggests a markedly smaller settlement of no more than 7 hectares confined chiefly to the northern half of the mound (McMahon 2009, 217, see also McMahon *et al.* 2005, 3 for a lower estimate).

14.1 Excavation history

The site has seen extensive rounds of excavations in the course of the last century; by the British in the 1930ies (Mallowan 1936, Mallowan 1937, Mallowan 1947, Curtis 1982), recommenced again in the late 1990ies (McMahon *et al.* 2001, McMahon *et al.* 2005), and presently by a Syro-Belgian project. The early excavations took a particular interest in Chalcolithic and Early Bronze Age strata, but also exposed extensive transects of Middle Bronze Age settlements on the summit of the mound. Mallowan's initial season in 1934-35 excavated a 15 metre deep sondage in the northwest end of the mound (Area M, the 'Prehistoric Pit'), along with remains of what is presumably Middle Bronze Age domestic housing in Area TD and EH (Mallowan 1936, 6). During 1936, Mallowan laid a massive trench across the central portion of the site to investigate Bronze Age remains, comprising the main investigation areas BD, TD, and AB. The same season also saw the first discovery of cuneiform tablets at the site, namely two Early Bronze Age dockets and nine Middle Bronze Age tablets from Area BD and AB (Mallowan 1937, 114-115, Gadd 1937). In the course of a fortnights' work in 1937, further excavations in Area TD reached the public structure in the early Middle Bronze Age stratum, where the bulk of the texts were found (Gadd 1940). These were located in a small room, (Area TD Room 106), measuring 2.4x2.6 metres, partially resting on potsherds suggested to be the remains of storage trays (Mallowan 1947, 82-83). Though the building was evidently a substantial structure, overlying strata only allowed for the excavation of a handful of small rooms before work was shifted to Tall Brak.

Renewed excavations at the site came about through a joint mission of the Syrian Directorate General of Antiquities, the British School of Archaeology in Iraq and the University of Liège over four seasons from 1999-2003 (McMahon *et al.* 2001, McMahon *et al.* 2005, also McMahon 2009). Investigations followed an ambitious research agenda aimed at obtaining a better understanding of the dynamics of settlement internal to the site, but also the role of the site in relation to regional settlement patterns across the Khabūr Plains. Excavations in the first seasons have sought to refine initial phasings developed by Mallowan, and have thus targeted areas able to complement earlier findings and further refine the overall sequence of settlement, notably around the deep sounding (Area E and K) in the north, on the southern flank of the mound (Area C and D), and with a more direct focus on the Middle Bronze Age strata on the central and northeast part of the mound (Areas A, G, and I) (McMahon *et al.* 2001). Subsequent seasons have investigated further the Middle Bronze Age remains, and established a more detailed sequence of construction phases traversing the periods before and after the 18th century BCE cuneiform assemblages (McMahon *et al.* 2005). Since 2004, excavations have been undertaken by the DGAM and the University of Liege (see www.sumer_akkad.ugent.be), with continued investigation of pre-historic and Early Bronze Age strata (in Area F, H, and D) (Tunca *et al.* 2006, Tunca *et al.* 2007), and extensive exposures of Middle Bronze Age layers in the centre of the mound (Area I), partly overlapping with Mallowan's Areas TD and AB.

14.2 Regional surveys

Notwithstanding that the Khabūr Basin ranks among the most extensively surveyed archaeological regions of the Middle East (see overview map in Quenet 2011, Fig. 1), no systematic or intensive survey of the Ašnakkum hinterland is at present available, though initial preparations were being made prior to the beginning of current hostilities in Syria (Tanret 2010). As such, data on which to build a reasonable impression of the Ašnakkum hinterland during the Middle Bronze Age must rely on a rather diverse body of sources deriving from several different projects. Dispersed information on a few of the satellite settlements are available from Mallowan's reports, and should be briefly summarised here; the initial survey of tells in the Khabūr Basin in 1934 examined also Tall Khanzīr five kilometres due south on the right bank of the Wādī Khanzīr. Details of this work were, however, not published (Mallowan 1936, 2). As part of his continued work in the area, Mallowan undertook soundings at a couple of sites in the vicinity in 1935 and 1936 (Koliński 2007, 73). Gir Maiyr, a small satellite four kilometres due west of Tall Šāghir Bāzār, yielded clear evidence of Chalcolithic and Early Bronze Age occupation, yet there are no signs of occupation during the Middle Bronze Age (Mallowan 1937, 116 and Fig. 113). Similar observations were made from soundings at Tall Arbid 15 kilometres east, again with evidence of Early Bronze Age settlement. This site did, however, also present evidence of domestic housing units contemporary with early

Middle Bronze Age levels at Tall Šāghir Bāzār (Mallowan 1937, 117 and Fig. 114, Koliński 2007).

A team from the University of Edinburgh carried out a survey in the upper reaches of the Wādī Dara north of Tall Šāghir Bāzār in the mid-1970ies, yet published data relates only to Halaf settlements, which was the main focus of this project (Davidson and McKerrell 1976). The important survey of the western Khabūr Basin directed by Lyonnet from 1989-1991 constitutes the most extensive dataset for understanding Middle Bronze Age settlement organisation within the general region (Lyonnet 2000b). These investigations necessarily left out Tall Šāghir Bāzār and its immediate hinterland, since the project focused on settlement remains not formerly subjected to archaeological investigation (Lyonnet and Faivre 2014, 214-215 for a recent summary). An offshoot of the latter project was directed by Nishiaki and involved a more intensive survey of the Wādī Dara drainage to re-examine the extent of pre-historic settlements surveyed by the University of Edinburgh (Nishiaki 1992). While bringing us closer to the land immediately around Tall Šāghir Bāzār, evidence of Bronze Age occupation collected by this survey is generally scant and, moreover, insufficiently dated (Lyonnet 2000a, 38).

Additional surveys from comparable landscape types across the Khabūr basin are available, especially from Tall Baydar (Beydar) further west (Wilkinson 2002, Ur and Wilkinson 2008), and to the east also from Tall Līlān (Ristvet 2005). These can be used to augment our understanding of the settlement and its surroundings. With regards to the latter dataset, some general observations on the divergent modes of settlement organisation within the Bronze Age Khabūr Basin as a whole are in order. Settlement patterns of the early 2nd millennium BCE western Khabūr Basin differ markedly from areas further east (e.g. Lyonnet and Faivre 2014). While the Leilan Regional Survey has detected a virtual explosion in the number of settled sites during the LRS Phase 7 (ca. 1900-1700 BCE) (Ristvet 2005), concurrent population figures west of the Jaghjagh seem to follow very different trajectories. For the Tall Baydar hinterland, Wilkinson has emphasised the general paucity of Middle Bronze Age settlements (Wilkinson 2002, but consider observations in Wilkinson and Cunliffe 2012), and discussed the very similar conclusions made by Lyonnet for the western Khabūr more generally (Lyonnet 1996).

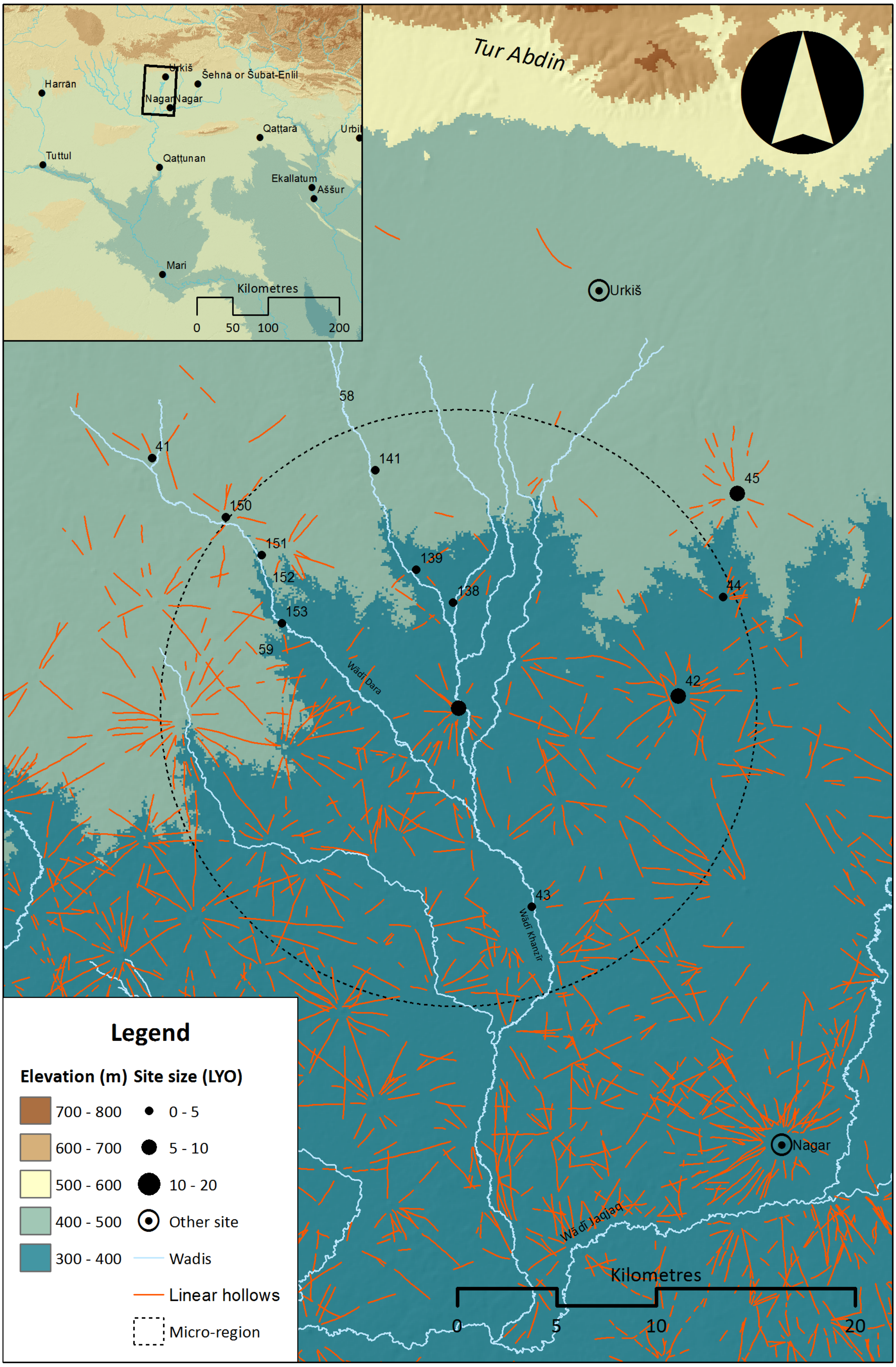


Figure 14.88: Ašnakkum (not numbered, centre) and associated Middle Bronze Age micro-region.

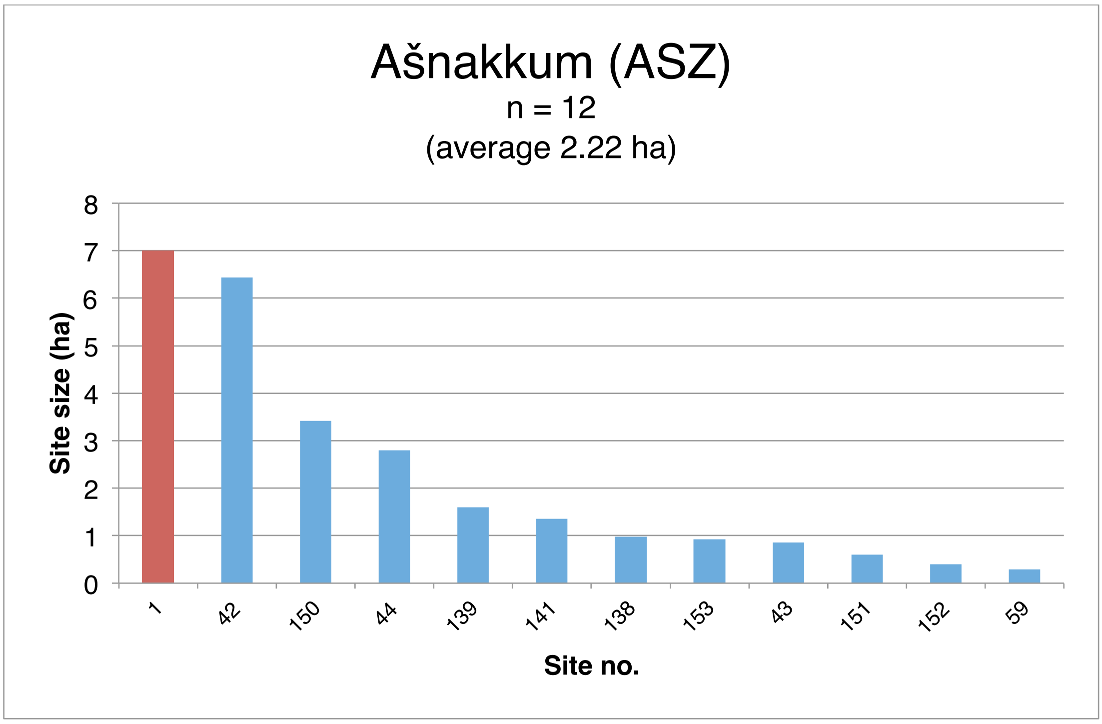


Figure 14.89: Histogram of Middle Bronze Age settlements within the Ašnakkum micro-region

We can assemble a rather patchy, yet not unconvincing settlement pattern for the Ašnakkum micro-region. Apart from the two Middle Bronze Age settlements that have been subjected to actual archaeological excavation, namely Tall ’Arbīd (7 ha) and Tall Šāghir Bāzār (7 ha) itself, the only other site of noticeable extent is Tall Ahmar (LYO 45, ca. 7 ha) 17 kilometres to the northeast. The gazetteer of sites supplied by Nishiaki is admittedly superficial with regards to historical periods (Lyonnet 2000a, 38), yet the site dimensions generated from imagery do not seem to contradict hierarchies found elsewhere. Apart from Tall Quliah (LYO 150, ca. 3.4 ha), all sites found in the northern part of the Wādī Dara system are hamlets of 1-2 ha. That these types of settlements can be found with at least some regularity also for the Middle Bronze Age Western Khabūr is implied by the small hamlet of Tall Farhu (LYO 43) some 10 kilometres to the south. Despite its modest size (<1 ha), the site yielded a high concentration of ceramics securely dated to the 18th century BCE (Lyonnet and Faivre 2014). The emerging settlement region is characterised then by small towns, and a few hamlets, with no extensive urban settlements in the immediate vicinity (but note that Tall Brak lies less than 30 kilometres to the southeast). Two settlements located relatively close by appear in the textual assemblage from Ašnakkum itself, and should be briefly considered here.

14.2.1.1 Tall ’Arbīd and Middle Bronze Age Amaz

The site of Tall ’Arbīd lies some 11 km due east of Ašnakkum, and constitutes a mound of comparable size (c. 7 ha). Following initial soundings by Mallowan in 1936 (see above), excavations at Tall ’Arbīd has been conducted since 1996 by a Polish team directed by Piotr Bieliński of the University of Warzaw (see for preliminary reports up until 2009 http://www.tellarbid.uw.edu.pl). The discovery of a fragmentary Old Assyrian envelope at ’Arbīd has led Eidem to propose an identification of the site with Middle Bronze Age Amaz (Eidem 2008b, 40, also Bieliński 2000, Fig. 2). The town of Amaz is amply documented in correspondence from Mari as well as Šehnā (Eidem 2008b, 40), and it should be noted that a recent survey of assemblages of Early Khabur Ware presented by Koliński further substantiates this identification (2014a, 31), or at the very least confirms the prolonged duration of Middle Bronze Age occupation at the site. From the perspective of the epistolary sources, the rulers of Amaz were evidently not among the principal political entities of the Khabūr Basin at this time, but the settlement was occasionally contested by more powerful lords (see e.g. summary of evidence in Eidem 2011a, 300-301), and local authorities engaged with neighbouring elites. Ismail 1991, Text 11 records a gift of wine and syrup brought by Zigê, master of Amaz, to the court at Šehnā (also an ox, in a damaged context, in Vincente 1991, Text 164). On another occasion, the same man received a gift from the ruler of Šehnā (Vincente 1991, Text 95). Another individual from Amaz is recorded as the owner of a flock of 127 sheep entrusted to a livestock manager at Šehnā in Vincente 1991, Text 165. While Amaz then clearly constituted a settlement with an institutional household organisation of its own, no sources are able to elucidate the relationship between this town and Ašnakkum, a mere 11 kilometres to the west.

14.2.1.2 Qirdahat

The town of Qirdahat appears in the administrative documentation from Ašnakkum both as an important settlement and a grazing area for livestock. A troop of 2,770 men from the district of Qirdahat (Akk. *halaṣ Qirdahat*) receives provisions from the grain storage of Ašnakkum in OBTCB 19, while a flock of some 40 horses and mules receives fodder in the environs of Qirdahat according to OBTCB 22, dated early winter in the year of Adad-bānī (REL 196). The town evidently constituted an important way station through the central Khabūr Basin, and a recently published itinerary has led Charpin to identify the toponym with modern al-Hasakah, on the confluence of the Khabūr River and the Wādī Jaghjagh (Charpin 2009, 67-68 with further references, for an English version, see Charpin 2010a, 40-41). While not much mentioned in Mari sources, the important status of the town and its ruler comes through also in the later documentation from Šehnā. A master of Qirdahat receives a bronze dagger and a spear, presumably as a gift, in Ismail 1991, Text 108, and a group of men from the same locality are given silver rings in Ismail 1991, 122. In Vincente 1991, Text 32, mention is made of a man working among the fatteners (Akk. *marû*) of the master of Qirdahat.

14.3 Textual sources

Textual finds from Middle Bronze Age Ašnakkum number a total 338 published texts and fragments (Figure 14.90). Two Early Bronze Age dockets dating to the latter half of the 3rd millennium BCE (A.391 and A.393, cf. Gadd 1937, 178) were found in a discard context in Mallowan's Level II (Mallowan 1937, 95). Save for these two specimens, textual finds date exclusively to the Middle Bronze Age, or more precisely the first quarter of the 18th century BCE. These comprise two main groups, one of 124 texts and fragments from Mallowan's excavations (complete edition in Talon 1997, with important comments in van Koppen 2000, partial earlier editions Loretz 1969, Snell 1983, preliminary overview by Gadd 1937, Gadd 1940), another largely contemporary corpus unearthed in current excavations, of which 214, found in 2000-2002 have been published (Tunca and Baghdo 2008). A more recent lot of 57 tablets, excavated in 2008, has not yet been published (Lacambre 2010, 98).

14.3.1 Area AB and BD: Stray finds

Small groups of texts, both from the excavations conducted by Mallowan and from contemporary investigations, can be divided into individual groups according to findspot. Eight texts, namely OBTCB 1-7 and 9, stem from a part of Area AB apparently in close vicinity to the excavation areas of the Syro-Belgian expedition (Mallowan 1937, 114, van Koppen 2000, 337, Tunca and Baghdo 2008, 5-7). The contents of these texts are related to a few examples retrieved by contemporary excavations, as the same individual appears in six texts concerned with grain, flour, and bread**.** The texts further demonstrate a probable link to the beer disbursement records, as two of them record disbursements of seeds and grain to Huhān, likely identical to the overseer of the beer office. A further three texts were found scattered in adjacent areas, one of which (CB III 1) shows some similarities to the group of texts from Area AB. This text further mentions a certain Qištum, whose name appears in a ration record from the grain office as *šē'iqum* ('ration accountant') along with two other individuals (Lacambre and Millet Albà 2008a, 223-224). CB III 58 is a fragment likely to stem from the main body of beer records, while CB III 153 cannot be immediately related to other groups, since it records fodder for donkeys and perhaps an allotment of beer. Finally, CB III 2 is clearly related to the group from Area AB, as it mentions Balṭu-kašid as the overseer of a transfer of flour and bread. CB III 65 and 84 both relate in subject matter to the beer office, but were found as scatters. OBTCB 8 and 10 derive from the northern part of the large trench excavated by Mallowan, labelled Area BD (Mallowan 1937, 114, also van Koppen 2000, 337), though their exact relationship to a substantial structure erected there later in the Middle Bronze Age is not clear. Both record deliveries of goods; the first mention ten donkey-loads of grain delivered by ten named individuals, the second 52 *qa* of lard received from two farmers.

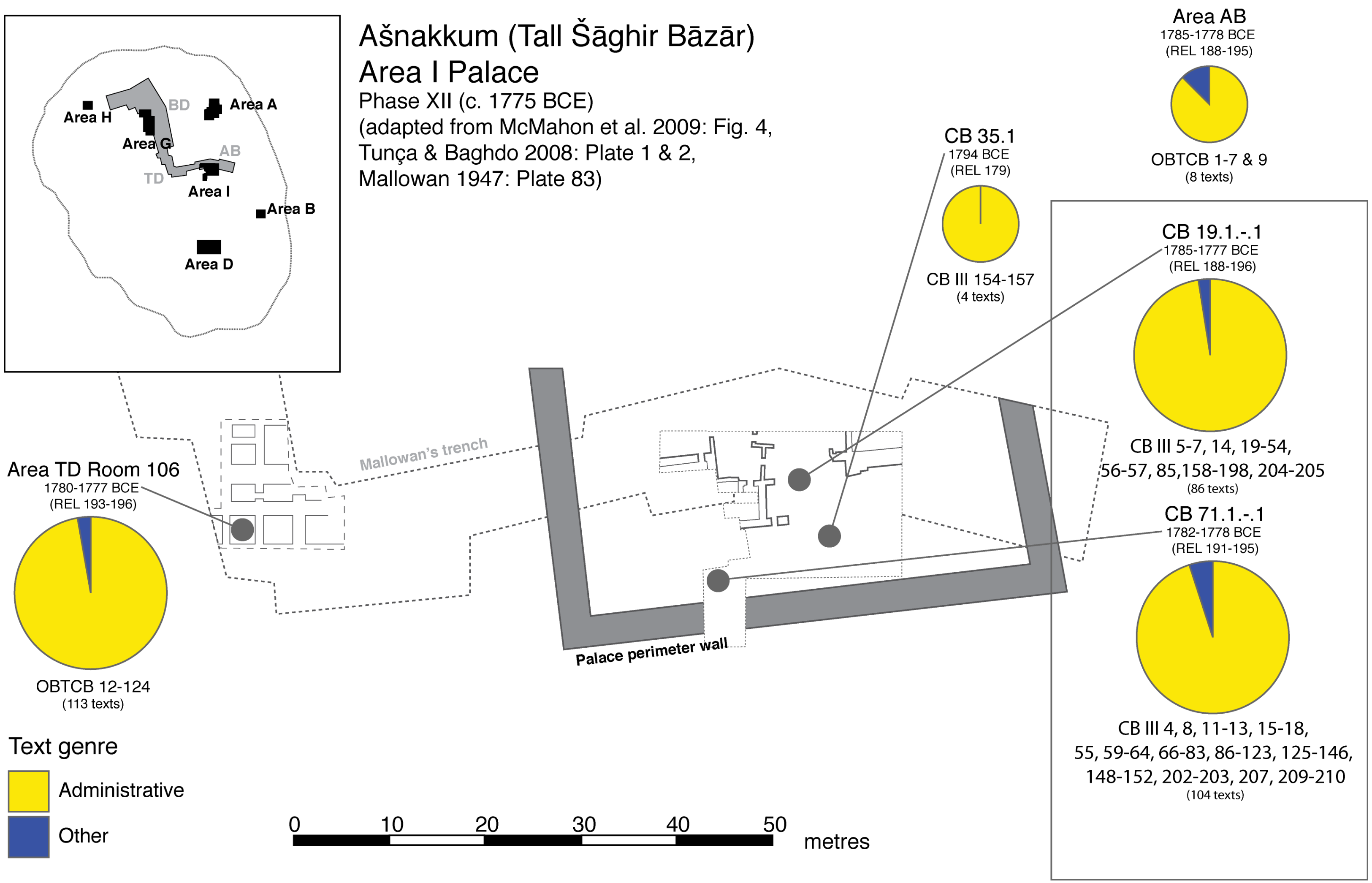


Figure 14.90: Distribution of cuneiform assemblages within Area I and Area TD at Ašnakkum

14.3.2 Area TD Room 106: The grain storage archive

The former group derives, primarily, from a single room (Mallowan's Area TD Room 106) on the central part of the mound, some hundred metres west of the main palatial structure (Curtis 1982, 82, van Koppen 2000, 337-338). According to Mallowan's reports, the tablets were found in part resting on broken ceramic trays, suggestive of a primary storage context (Mallowan 1947, 82). The group presents a relatively uniform lot of 113 administrative records, likely associated with the settlements main grain storage. The assemblage relates to bulk allocations of grain along with some disbursements of flour and bread, and, if inferring from a summary given in OBTCB 62, the structure from which they stem may be 'the palace grain storage' (*našpakātim ša ēkallim*). In terms of dating, the assemblage falls within a very narrow timeframe within REL 193-196 (1780-1777 BCE), with a majority of 48 out of 57 dated texts attributed to the last year. As Eidem has noted, this is a regularly occurring pattern in working administrative assemblages, and thus likely another indication of the primary context of this text group (Eidem 1989, 71).

14.3.3 Area I: The palace beer records

The second group stems principally from the palace courtyard, and are associated with the brewing and distribution of beer to the palatial household. The texts were evidently disposed of in antiquity, as the bulk of the assemblage derives from two pits dug into the courtyard surface, with a few stray finds from adjacent areas (Tunca and Baghdo 2008, 10-12). Apart from the dating of the assemblage, a number of personal links serve to managerially associate this corpus and that of the grain records in Area TD further east.

14.4 Analytical groups

Reflecting the archaeological context described above, analytical groups from Ašnakkum fall in two clearly distinguishable sections. One is ASZ Dossier 1, the beer disbursement records from the palace precinct on the eastern side of the mound, another ASZ Dossier 2, 3, and 4, which all relate to Area TD Room 106 in the structure further west.

14.4.1 Dossier (Group) ASZ 1: Beer disbursement records

This dossier encompasses a total 194 catalogued disbursement records comprised in Series (Group) ASZ 1-4. With a few exceptions, this constitutes the bulk of texts published by the Syro-Belgian excavations (Tunca and Baghdo 2008). All of the texts contained in this dossier are associated with either of four related series, i.e. ASZ Series 1-4. A detailed discussion of all of these analytical groups is given in Chapter 6.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_133_0_0	CBIII_009	6	8	191	CB2.1	Damaged
ASZ_134_0_0	CBIII_010	19	13	191	CB2.1	Fairly complete
ASZ_135_0_0	CBIII_011	10	12	191	CB71.1.-.1	Fairly complete
ASZ_136_0_0	CBIII_012		11	191	CB71.1.-.1	Damaged
ASZ_137_0_0	CBIII_013		11	191	CB71.1.-.1	Damaged
ASZ_138_0_0	CBIII_014	18		191	CB19.1.-.1	Damaged
ASZ_139_0_0	CBIII_015		8	194	CB71.1.-.1	Fairly complete
ASZ_140_0_0	CBIII_016			194	CB71.1.-.1	Damaged
ASZ_141_0_0	CBIII_017			194	CB71.1.-.1	Fairly complete
ASZ_142_0_0	CBIII_018				CB71.1.-.1	Damaged
ASZ_143_0_0	CBIII_019	11	1	195	CB19.1.-.1	Fairly complete
ASZ_144_0_0	CBIII_020	13	1	195	CB19.1.-.1	Complete
ASZ_145_0_0	CBIII_021	15	1	195	CB19.1.-.1	Complete
ASZ_146_0_0	CBIII_022	16	1	195	CB19.1.-.1	Complete
ASZ_147_0_0	CBIII_023	17	1	195	CB19.1.-.1	Complete
ASZ_148_0_0	CBIII_024	18	1	195	CB19.1.-.1	Fairly complete
ASZ_149_0_0	CBIII_025	26	1	195	CB19.1.-.1	Complete
ASZ_150_0_0	CBIII_026	27	1	195	CB19.1.-.1	Complete
ASZ_151_0_0	CBIII_027	29	1	195	CB19.1.-.1	Fairly complete
ASZ_152_0_0	CBIII_028	30	1	195	CB19.1.-.1	Fairly complete
ASZ_153_0_0	CBIII_029	3	2	195	CB19.1.-.1	Fairly complete
ASZ_154_0_0	CBIII_030	4	2	195	CB19.1.-.1	Complete
ASZ_155_0_0	CBIII_031	18	2	195	CB19.1.-.1	Complete
ASZ_156_0_0	CBIII_032	19	2	195	CB19.1.-.1	Complete
ASZ_157_0_0	CBIII_033	27	2	195	CB19.1.-.1	Complete
ASZ_158_0_0	CBIII_034	28	2	195	CB19.1.-.1	Complete
ASZ_159_0_0	CBIII_035	30	2	195	CB19.1.-.1	Complete
ASZ_160_0_0	CBIII_036	1	6	195	CB19.1.-.1	Complete
ASZ_161_0_0	CBIII_037	5	6	195	CB19.1.-.1	Complete
ASZ_162_0_0	CBIII_038	7	6	195	CB19.1.-.1	Complete
ASZ_163_0_0	CBIII_039	8	6	195	CB19.1.-.1	Complete
ASZ_164_0_0	CBIII_040	10	6	195	CB19.1.-.1	Complete
ASZ_165_0_0	CBIII_041	11	6	195	CB19.1.-.1	Complete
ASZ_166_0_0	CBIII_042	12	6	195	CB19.1.-.1	Complete
ASZ_167_0_0	CBIII_043	14	6	195	CB19.1.-.1	Complete
ASZ_168_0_0	CBIII_044	15	6	195	CB19.1.-.1	Complete
ASZ_169_0_0	CBIII_045	29	6	195	CB19.1.-.1	Complete
ASZ_170_0_0	CBIII_046	30	6	195	CB19.1.-.1	Complete
ASZ_171_0_0	CBIII_047	1	7	195	CB19.1.-.1	Complete
ASZ_172_0_0	CBIII_048	4	7	195	CB19.1.-.1	Complete
ASZ_173_0_0	CBIII_049	5	7	195	CB19.1.-.1	Complete
ASZ_174_0_0	CBIII_050	17	7	195	CB19.1.-.1	Complete
ASZ_175_0_0	CBIII_051	18	7	195	CB19.1.-.1	Complete

ASZ_176_0_0	CBIII_052	19	7	195	CB19.1.-.1	Complete
ASZ_177_0_0	CBIII_053	20	7	195	CB19.1.-.1	Fairly complete
ASZ_178_0_0	CBIII_054	23	7	195	CB19.1.-.1	Complete
ASZ_179_0_0	CBIII_055	11	4	195	CB71.1.-.1	Fairly complete
ASZ_180_0_0	CBIII_056	1	3	196	CB19.1.-.1	Complete
ASZ_181_0_0	CBIII_057		1		CB19.1.-.1	Damaged
ASZ_182_0_0	CBIII_058				CB27.1	Damaged
ASZ_183_0_0	CBIII_059				CB71.1.-.1	Damaged
ASZ_184_0_0	CBIII_060				CB71.1.-.1	Fairly complete
ASZ_185_0_0	CBIII_061				CB71.1.-.1	Damaged
ASZ_186_0_0	CBIII_062	25	6	193	CB71.1.-.1	Damaged
ASZ_187_0_0	CBIII_063	21	7	193	CB71.1.-.1	Damaged
ASZ_188_0_0	CBIII_064		9	193	CB71.1.-.1	Damaged
ASZ_189_0_0	CBIII_065	5	10	193	CB1.1.-.23	Complete
ASZ_190_0_0	CBIII_066	3		193	CB71.1.-.1	Damaged
ASZ_191_0_0	CBIII_067	17		193	CB71.1.-.1	Damaged
ASZ_192_0_0	CBIII_068	20		193	CB71.1.-.1	Damaged
ASZ_193_0_0	CBIII_069			193	CB71.1.-.1	Damaged
ASZ_194_0_0	CBIII_070			193	CB71.1.-.1	Damaged
ASZ_195_0_0	CBIII_071		1	194	CB71.1.-.1	Damaged
ASZ_196_0_0	CBIII_072	10	3	194	CB71.1.-.1	Damaged
ASZ_197_0_0	CBIII_073	15	4	194	CB71.1.-.1	Fairly complete
ASZ_198_0_0	CBIII_074	21	4	194	CB71.1.-.1	Damaged
ASZ_199_0_0	CBIII_075		4	194	CB71.1.-.1	Damaged
ASZ_200_0_0	CBIII_076			194	CB71.1.-.1	Damaged
ASZ_201_0_0	CBIII_077	10	10	194	CB71.1.-.1	Damaged
ASZ_202_0_0	CBIII_078				CB71.1.-.1	Damaged
ASZ_203_0_0	CBIII_079	29	10	194	CB71.1.-.1	Damaged
ASZ_204_0_0	CBIII_080	7	12	194	CB71.1.-.1	Damaged
ASZ_205_0_0	CBIII_081	11	12	194	CB71.1.-.1	Damaged
ASZ_206_0_0	CBIII_082			194	CB71.1.-.1	Damaged
ASZ_207_0_0	CBIII_083		12	194	CB71.1.-.1	Damaged
ASZ_208_0_0	CBIII_084	25	12	195	CB13.1.-.1	Damaged
ASZ_209_0_0	CBIII_085				CB19.1.-.1	Damaged
ASZ_210_0_0	CBIII_086				CB71.1.-.1	Damaged
ASZ_211_0_0	CBIII_087				CB71.1.-.1	Damaged
ASZ_212_0_0	CBIII_088				CB71.1.-.1	Damaged
ASZ_213_0_0	CBIII_089				CB71.1.-.1	Damaged
ASZ_214_0_0	CBIII_090				CB71.1.-.1	Damaged
ASZ_215_0_0	CBIII_091				CB71.1.-.1	Damaged
ASZ_216_0_0	CBIII_092				CB71.1.-.1	Damaged
ASZ_217_0_0	CBIII_093				CB71.1.-.1	Damaged
ASZ_218_0_0	CBIII_094				CB71.1.-.1	Damaged
ASZ_219_0_0	CBIII_095				CB71.1.-.1	Damaged
ASZ_220_0_0	CBIII_096				CB71.1.-.1	Damaged
ASZ_221_0_0	CBIII_097				CB71.1.-.1	Damaged
ASZ_222_0_0	CBIII_098	3			CB71.1.-.1	Fairly complete
ASZ_223_0_0	CBIII_099				CB71.1.-.1	Damaged
ASZ_128_0_0	CBIII_004	7	2	193	CB71.1.-.1	Fairly complete

ASZ_129_0_0	CBIII_005	2	1	191	CB19.1.-.1	Complete
ASZ_130_0_0	CBIII_006	5	1	191	CB19.1.-.1	Fairly complete
ASZ_131_0_0	CBIII_007	9	1	191	CB19.1.-.1	Complete
ASZ_132_0_0	CBIII_008	23	3	191	CB71.1.-.1	Fairly complete
ASZ_224_0_0	CBIII_100				CB71.1.-.1	Damaged
ASZ_225_0_0	CBIII_101	21			CB71.1.-.1	Damaged
ASZ_226_0_0	CBIII_102				CB71.1.-.1	Damaged
ASZ_227_0_0	CBIII_103				CB71.1.-.1	Damaged
ASZ_228_0_0	CBIII_104				CB71.1.-.1	Damaged
ASZ_229_0_0	CBIII_105				CB71.1.-.1	Damaged
ASZ_230_0_0	CBIII_106				CB71.1.-.1	Damaged
ASZ_231_0_0	CBIII_107				CB71.1.-.1	Damaged
ASZ_232_0_0	CBIII_108				CB71.1.-.1	Damaged
ASZ_233_0_0	CBIII_109				CB71.1.-.1	Damaged
ASZ_234_0_0	CBIII_110				CB71.1.-.1	Damaged
ASZ_235_0_0	CBIII_111				CB71.1.-.1	Damaged
ASZ_236_0_0	CBIII_112				CB71.1.-.1	Damaged
ASZ_237_0_0	CBIII_113				CB71.1.-.1	Damaged
ASZ_238_0_0	CBIII_114				CB71.1.-.1	Damaged
ASZ_239_0_0	CBIII_115				CB71.1.-.1	Damaged
ASZ_240_0_0	CBIII_116				CB71.1.-.1	Damaged
ASZ_241_0_0	CBIII_117				CB71.1.-.1	Damaged
ASZ_242_0_0	CBIII_118				CB71.1.-.1	Damaged
ASZ_243_0_0	CBIII_119				CB71.1.-.1	Damaged
ASZ_244_0_0	CBIII_120				CB71.1.-.1	Damaged
ASZ_245_0_0	CBIII_121				CB71.1.-.1	Damaged
ASZ_246_0_0	CBIII_122				CB71.1.-.1	Damaged
ASZ_247_0_0	CBIII_123				CB71.1.-.1	Damaged
ASZ_248_0_0	CBIII_124				CBL.38/L.42	Damaged
ASZ_249_0_0	CBIII_125				CB71.1.-.1	Damaged
ASZ_250_0_0	CBIII_126				CB71.1.-.1	Damaged
ASZ_251_0_0	CBIII_127				CB71.1.-.1	Damaged
ASZ_252_0_0	CBIII_128				CB71.1.-.1	Damaged
ASZ_253_0_0	CBIII_129				CB71.1.-.1	Damaged
ASZ_254_0_0	CBIII_130				CB71.1.-.1	Damaged
ASZ_255_0_0	CBIII_131				CB71.1.-.1	Damaged
ASZ_256_0_0	CBIII_132				CB71.1.-.1	Damaged
ASZ_257_0_0	CBIII_133				CB71.1.-.1	Damaged
ASZ_258_0_0	CBIII_134				CB71.1.-.1	Damaged
ASZ_259_0_0	CBIII_135				CB71.1.-.1	Damaged
ASZ_260_0_0	CBIII_136				CB71.1.-.1	Damaged
ASZ_261_0_0	CBIII_137				CB71.1.-.1	Damaged
ASZ_262_0_0	CBIII_138				CB71.1.-.1	Damaged
ASZ_263_0_0	CBIII_139				CB71.1.-.1	Damaged
ASZ_264_0_0	CBIII_140				CB71.1.-.1	Damaged
ASZ_265_0_0	CBIII_141				CB71.1.-.1	Damaged
ASZ_266_0_0	CBIII_142				CB71.1.-.1	Damaged
ASZ_267_0_0	CBIII_143	13	9		CB71.1.-.1	Damaged
ASZ_268_0_0	CBIII_144				CB71.1.-.1	Damaged

ASZ_269_0_0	CBIII_145				CB71.1.-.1	Damaged
ASZ_270_0_0	CBIII_146				CB71.1.-.1	Damaged
ASZ_271_0_0	CBIII_147				CB4.1	Damaged
ASZ_272_0_0	CBIII_148				CB71.1.-.1	Damaged
ASZ_273_0_0	CBIII_149				CB71.1.-.1	Damaged
ASZ_274_0_0	CBIII_150				CB71.1.-.1	Damaged
ASZ_275_0_0	CBIII_151				CB71.1.-.1	Damaged
ASZ_276_0_0	CBIII_152				CB71.1.-.1	Damaged
ASZ_278_0_0	CBIII_154	30	1	179	CB35.1	Damaged
ASZ_279_0_0	CBIII_155	10	12	179	CB35.1	Complete
ASZ_280_0_0	CBIII_156	11	12	179	CB35.1	Fairly complete
ASZ_281_0_0	CBIII_157	15	12	179	CB35.1	Complete
ASZ_282_0_0	CBIII_158	10	9	188	CB19.1.-.1	Complete
ASZ_283_0_0	CBIII_159	8	1	195	CB19.1.-.1	Complete
ASZ_284_0_0	CBIII_160	10	1	195	CB19.1.-.1	Complete
ASZ_285_0_0	CBIII_161	11	1	195	CB19.1.-.1	Complete
ASZ_286_0_0	CBIII_162	16	1	195	CB19.1.-.1	Complete
ASZ_287_0_0	CBIII_163	21	1	195	CB19.1.-.1	Complete
ASZ_288_0_0	CBIII_164	23	1	195	CB19.1.-.1	Complete
ASZ_289_0_0	CBIII_165	0	2	195	CB19.1.-.1	Complete
ASZ_290_0_0	CBIII_166	6	2	195	CB19.1.-.1	Complete
ASZ_291_0_0	CBIII_167	6	2	195	CB19.1.-.1	Complete
ASZ_292_0_0	CBIII_168	3	6	195	CB19.1.-.1	Complete
ASZ_293_0_0	CBIII_169	9	6	195	CB19.1.-.1	Complete
ASZ_294_0_0	CBIII_170	12	6	195	CB19.1.-.1	Complete
ASZ_295_0_0	CBIII_171	15	6	195	CB19.1.-.1	Complete
ASZ_296_0_0	CBIII_172	16	6	195	CB19.1.-.1	Complete
ASZ_297_0_0	CBIII_173	24	6	195	CB19.1.-.1	Complete
ASZ_298_0_0	CBIII_174	25	6	195	CB19.1.-.1	Complete
ASZ_299_0_0	CBIII_175	27	6	195	CB19.1.-.1	Complete
ASZ_300_0_0	CBIII_176	3	7	195	CB19.1.-.1	Complete
ASZ_301_0_0	CBIII_177	6	7	195	CB19.1.-.1	Fairly complete
ASZ_302_0_0	CBIII_178	14	7	195	CB19.1.-.1	Complete
ASZ_303_0_0	CBIII_179	19	7	195	CB19.1.-.1	Complete
ASZ_304_0_0	CBIII_180	19	7	195	CB19.1.-.1	Complete
ASZ_305_0_0	CBIII_181	23	7	195	CB19.1.-.1	Complete
ASZ_306_0_0	CBIII_182	27	7	195	CB19.1.-.1	Complete
ASZ_307_0_0	CBIII_183	28	7	195	CB19.1.-.1	Fairly complete
ASZ_308_0_0	CBIII_184	14	12	195	CB19.1.-.1	Complete
ASZ_309_0_0	CBIII_185	28	12	195	CB19.1.-.1	Complete
ASZ_310_0_0	CBIII_186	29	12	195	CB19.1.-.1	Complete
ASZ_311_0_0	CBIII_187	3	3	196	CB19.1.-.1	Complete
ASZ_312_0_0	CBIII_188	8	3	196	CB19.1.-.1	Complete
ASZ_313_0_0	CBIII_189	11	3	196	CB19.1.-.1	Complete
ASZ_314_0_0	CBIII_190	12	3	196	CB19.1.-.1	Fairly complete
ASZ_315_0_0	CBIII_191	16	3	196	CB19.1.-.1	Fairly complete
ASZ_316_0_0	CBIII_192	17	3	196	CB19.1.-.1	Complete
ASZ_317_0_0	CBIII_193	21	3	196	CB19.1.-.1	Complete
ASZ_318_0_0	CBIII_194	24	3	196	CB19.1.-.1	Complete

ASZ_319_0_0	CBIII_195	25	3	196	CB19.1.-.1	Complete
ASZ_320_0_0	CBIII_196	26	3	196	CB19.1.-.1	Complete
ASZ_321_0_0	CBIII_197	28	3	196	CB19.1.-.1	Fairly complete
ASZ_322_0_0	CBIII_198	2	4	196	CB19.1.-.1	Fairly complete

Table 14.65: Dossier (Group) ASZ 1 reference data

14.4.1.1 Series (Group) ASZ) 1: Beer disbursements for the cellar

This series comprises disbursement records CB III 4-61, a total of 58 texts exclusively recording daily issues of beer to the cellar (Akk. *kannu*) of the palace household (see for a discussion of this series in general Lacambre and Millet Albà 2008a, 228-238). In CB III 42, four donkey-loads of beer are referred both to the cellar and to a detachment of troops receiving meals (Sum. nig2-gub). In CB III 4, three donkey-loads and four *sūtu* are issued for the cellar on the occasion of the feast of the 7th day of the 7th month, a celebration in the early Autumn observed also at Mari and across the Tigris (cf. Lacambre and Millet Albà 2008d, 21). Apart from these two, close to all issues concern beer in the amount of 50-100 *qa* per delivery.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_128_0_0	CBIII_004	7	2	193	CB71.1.-.1	Fairly complete
ASZ_129_0_0	CBIII_005	2	1	191	CB19.1.-.1	Complete
ASZ_130_0_0	CBIII_006	5	1	191	CB19.1.-.1	Fairly complete
ASZ_131_0_0	CBIII_007	9	1	191	CB19.1.-.1	Complete
ASZ_132_0_0	CBIII_008	23	3	191	CB71.1.-.1	Fairly complete
ASZ_133_0_0	CBIII_009	6	8	191	CB2.1	Damaged
ASZ_134_0_0	CBIII_010	19	13	191	CB2.1	Fairly complete
ASZ_135_0_0	CBIII_011	10	12	191	CB71.1.-.1	Fairly complete
ASZ_136_0_0	CBIII_012		11	191	CB71.1.-.1	Damaged
ASZ_137_0_0	CBIII_013		11	191	CB71.1.-.1	Damaged
ASZ_138_0_0	CBIII_014	18		191	CB19.1.-.1	Damaged
ASZ_139_0_0	CBIII_015		8	194	CB71.1.-.1	Fairly complete
ASZ_140_0_0	CBIII_016			194	CB71.1.-.1	Damaged
ASZ_141_0_0	CBIII_017			194	CB71.1.-.1	Fairly complete
ASZ_142_0_0	CBIII_018				CB71.1.-.1	Damaged
ASZ_143_0_0	CBIII_019	11	1	195	CB19.1.-.1	Fairly complete
ASZ_144_0_0	CBIII_020	13	1	195	CB19.1.-.1	Complete
ASZ_145_0_0	CBIII_021	15	1	195	CB19.1.-.1	Complete
ASZ_146_0_0	CBIII_022	16	1	195	CB19.1.-.1	Complete
ASZ_147_0_0	CBIII_023	17	1	195	CB19.1.-.1	Complete
ASZ_148_0_0	CBIII_024	18	1	195	CB19.1.-.1	Fairly complete
ASZ_149_0_0	CBIII_025	26	1	195	CB19.1.-.1	Complete
ASZ_150_0_0	CBIII_026	27	1	195	CB19.1.-.1	Complete
ASZ_151_0_0	CBIII_027	29	1	195	CB19.1.-.1	Fairly complete
ASZ_152_0_0	CBIII_028	30	1	195	CB19.1.-.1	Fairly complete
ASZ_153_0_0	CBIII_029	3	2	195	CB19.1.-.1	Fairly complete

ASZ_154_0_0	CBIII_030	4	2	195	CB19.1.-.1	Complete
ASZ_155_0_0	CBIII_031	18	2	195	CB19.1.-.1	Complete
ASZ_156_0_0	CBIII_032	19	2	195	CB19.1.-.1	Complete
ASZ_157_0_0	CBIII_033	27	2	195	CB19.1.-.1	Complete
ASZ_158_0_0	CBIII_034	28	2	195	CB19.1.-.1	Complete
ASZ_159_0_0	CBIII_035	30	2	195	CB19.1.-.1	Complete
ASZ_160_0_0	CBIII_036	1	6	195	CB19.1.-.1	Complete
ASZ_161_0_0	CBIII_037	5	6	195	CB19.1.-.1	Complete
ASZ_162_0_0	CBIII_038	7	6	195	CB19.1.-.1	Complete
ASZ_163_0_0	CBIII_039	8	6	195	CB19.1.-.1	Complete
ASZ_164_0_0	CBIII_040	10	6	195	CB19.1.-.1	Complete
ASZ_165_0_0	CBIII_041	11	6	195	CB19.1.-.1	Complete
ASZ_166_0_0	CBIII_042	12	6	195	CB19.1.-.1	Complete
ASZ_167_0_0	CBIII_043	14	6	195	CB19.1.-.1	Complete
ASZ_168_0_0	CBIII_044	15	6	195	CB19.1.-.1	Complete
ASZ_169_0_0	CBIII_045	29	6	195	CB19.1.-.1	Complete
ASZ_170_0_0	CBIII_046	30	6	195	CB19.1.-.1	Complete
ASZ_171_0_0	CBIII_047	1	7	195	CB19.1.-.1	Complete
ASZ_172_0_0	CBIII_048	4	7	195	CB19.1.-.1	Complete
ASZ_173_0_0	CBIII_049	5	7	195	CB19.1.-.1	Complete
ASZ_174_0_0	CBIII_050	17	7	195	CB19.1.-.1	Complete
ASZ_175_0_0	CBIII_051	18	7	195	CB19.1.-.1	Complete
ASZ_176_0_0	CBIII_052	19	7	195	CB19.1.-.1	Complete
ASZ_177_0_0	CBIII_053	20	7	195	CB19.1.-.1	Fairly complete
ASZ_178_0_0	CBIII_054	23	7	195	CB19.1.-.1	Complete
ASZ_179_0_0	CBIII_055	11	4	195	CB71.1.-.1	Fairly complete
ASZ_180_0_0	CBIII_056	1	3	196	CB19.1.-.1	Complete
ASZ_181_0_0	CBIII_057		1		CB19.1.-.1	Damaged
ASZ_182_0_0	CBIII_058				CB27.1	Damaged
ASZ_183_0_0	CBIII_059				CB71.1.-.1	Damaged
ASZ_184_0_0	CBIII_060				CB71.1.-.1	Fairly complete
ASZ_185_0_0	CBIII_061				CB71.1.-.1	Damaged

Table 14.66: Series (Group) ASZ 1 reference data

14.4.1.2 Series (Group) ASZ 2: Beer allotments to women and children

This series comprise disbursement records CB 62-152, a total of 91 texts recording daily issues of beer to female residents of the palace (Millet Albà 2008). Texts contained in this series are generally in a very poor state of preservation, and only three of the entire assemblage are in a complete or nearly complete state[6]. The preserved information relates almost exclusively to females and children of the

[6] The catalogue numbers employed in the primary publication has been maintained in the database here, but note that CB III 140-150 are all extremely fragmentary, and further that CB III 151 and 152 are catalogue numbers that cover respectively 38 and 35 fragments each.

household of the local lord, while occasionally including allotments to other individuals.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_186_0_0	CBIII_062	25	6	193	CB71.1.-.1	Damaged
ASZ_187_0_0	CBIII_063	21	7	193	CB71.1.-.1	Damaged
ASZ_188_0_0	CBIII_064		9	193	CB71.1.-.1	Damaged
ASZ_189_0_0	CBIII_065	5	10	193	CB1.1.-.23	Complete
ASZ_190_0_0	CBIII_066	3		193	CB71.1.-.1	Damaged
ASZ_191_0_0	CBIII_067	17		193	CB71.1.-.1	Damaged
ASZ_192_0_0	CBIII_068	20		193	CB71.1.-.1	Damaged
ASZ_193_0_0	CBIII_069			193	CB71.1.-.1	Damaged
ASZ_194_0_0	CBIII_070			193	CB71.1.-.1	Damaged
ASZ_195_0_0	CBIII_071		1	194	CB71.1.-.1	Damaged
ASZ_196_0_0	CBIII_072	10	3	194	CB71.1.-.1	Damaged
ASZ_197_0_0	CBIII_073	15	4	194	CB71.1.-.1	Fairly complete
ASZ_198_0_0	CBIII_074	21	4	194	CB71.1.-.1	Damaged
ASZ_199_0_0	CBIII_075		4	194	CB71.1.-.1	Damaged
ASZ_200_0_0	CBIII_076			194	CB71.1.-.1	Damaged
ASZ_201_0_0	CBIII_077	10	10	194	CB71.1.-.1	Damaged
ASZ_202_0_0	CBIII_078				CB71.1.-.1	Damaged
ASZ_203_0_0	CBIII_079	29	10	194	CB71.1.-.1	Damaged
ASZ_204_0_0	CBIII_080	7	12	194	CB71.1.-.1	Damaged
ASZ_205_0_0	CBIII_081	11	12	194	CB71.1.-.1	Damaged
ASZ_206_0_0	CBIII_082			194	CB71.1.-.1	Damaged
ASZ_207_0_0	CBIII_083		12	194	CB71.1.-.1	Damaged
ASZ_208_0_0	CBIII_084	25	12	195	CB13.1.-.1	Damaged
ASZ_209_0_0	CBIII_085				CB19.1.-.1	Damaged
ASZ_210_0_0	CBIII_086				CB71.1.-.1	Damaged
ASZ_211_0_0	CBIII_087				CB71.1.-.1	Damaged
ASZ_212_0_0	CBIII_088				CB71.1.-.1	Damaged
ASZ_213_0_0	CBIII_089				CB71.1.-.1	Damaged
ASZ_214_0_0	CBIII_090				CB71.1.-.1	Damaged
ASZ_215_0_0	CBIII_091				CB71.1.-.1	Damaged
ASZ_216_0_0	CBIII_092				CB71.1.-.1	Damaged
ASZ_217_0_0	CBIII_093				CB71.1.-.1	Damaged
ASZ_218_0_0	CBIII_094				CB71.1.-.1	Damaged
ASZ_219_0_0	CBIII_095				CB71.1.-.1	Damaged
ASZ_220_0_0	CBIII_096				CB71.1.-.1	Damaged
ASZ_221_0_0	CBIII_097				CB71.1.-.1	Damaged
ASZ_222_0_0	CBIII_098	3			CB71.1.-.1	Fairly complete
ASZ_223_0_0	CBIII_099				CB71.1.-.1	Damaged
ASZ_224_0_0	CBIII_100				CB71.1.-.1	Damaged
ASZ_225_0_0	CBIII_101	21			CB71.1.-.1	Damaged
ASZ_226_0_0	CBIII_102				CB71.1.-.1	Damaged
ASZ_227_0_0	CBIII_103				CB71.1.-.1	Damaged
ASZ_228_0_0	CBIII_104				CB71.1.-.1	Damaged
ASZ_229_0_0	CBIII_105				CB71.1.-.1	Damaged

ASZ_230_0_0	CBIII_106				CB71.1.-.1	Damaged
ASZ_231_0_0	CBIII_107				CB71.1.-.1	Damaged
ASZ_232_0_0	CBIII_108				CB71.1.-.1	Damaged
ASZ_233_0_0	CBIII_109				CB71.1.-.1	Damaged
ASZ_234_0_0	CBIII_110				CB71.1.-.1	Damaged
ASZ_235_0_0	CBIII_111				CB71.1.-.1	Damaged
ASZ_236_0_0	CBIII_112				CB71.1.-.1	Damaged
ASZ_237_0_0	CBIII_113				CB71.1.-.1	Damaged
ASZ_238_0_0	CBIII_114				CB71.1.-.1	Damaged
ASZ_239_0_0	CBIII_115				CB71.1.-.1	Damaged
ASZ_240_0_0	CBIII_116				CB71.1.-.1	Damaged
ASZ_241_0_0	CBIII_117				CB71.1.-.1	Damaged
ASZ_242_0_0	CBIII_118				CB71.1.-.1	Damaged
ASZ_243_0_0	CBIII_119				CB71.1.-.1	Damaged
ASZ_244_0_0	CBIII_120				CB71.1.-.1	Damaged
ASZ_245_0_0	CBIII_121				CB71.1.-.1	Damaged
ASZ_246_0_0	CBIII_122				CB71.1.-.1	Damaged
ASZ_247_0_0	CBIII_123				CB71.1.-.1	Damaged
ASZ_248_0_0	CBIII_124				CBL.38/L.42	Damaged
ASZ_249_0_0	CBIII_125				CB71.1.-.1	Damaged
ASZ_250_0_0	CBIII_126				CB71.1.-.1	Damaged
ASZ_251_0_0	CBIII_127				CB71.1.-.1	Damaged
ASZ_252_0_0	CBIII_128				CB71.1.-.1	Damaged
ASZ_253_0_0	CBIII_129				CB71.1.-.1	Damaged
ASZ_254_0_0	CBIII_130				CB71.1.-.1	Damaged
ASZ_255_0_0	CBIII_131				CB71.1.-.1	Damaged
ASZ_256_0_0	CBIII_132				CB71.1.-.1	Damaged
ASZ_257_0_0	CBIII_133				CB71.1.-.1	Damaged
ASZ_258_0_0	CBIII_134				CB71.1.-.1	Damaged
ASZ_259_0_0	CBIII_135				CB71.1.-.1	Damaged
ASZ_260_0_0	CBIII_136				CB71.1.-.1	Damaged
ASZ_261_0_0	CBIII_137				CB71.1.-.1	Damaged
ASZ_262_0_0	CBIII_138				CB71.1.-.1	Damaged
ASZ_263_0_0	CBIII_139				CB71.1.-.1	Damaged
ASZ_264_0_0	CBIII_140				CB71.1.-.1	Damaged
ASZ_265_0_0	CBIII_141				CB71.1.-.1	Damaged
ASZ_266_0_0	CBIII_142				CB71.1.-.1	Damaged
ASZ_267_0_0	CBIII_143	13	9		CB71.1.-.1	Damaged
ASZ_268_0_0	CBIII_144				CB71.1.-.1	Damaged
ASZ_269_0_0	CBIII_145				CB71.1.-.1	Damaged
ASZ_270_0_0	CBIII_146				CB71.1.-.1	Damaged
ASZ_271_0_0	CBIII_147				CB4.1	Damaged
ASZ_272_0_0	CBIII_148				CB71.1.-.1	Damaged
ASZ_273_0_0	CBIII_149				CB71.1.-.1	Damaged
ASZ_274_0_0	CBIII_150				CB71.1.-.1	Damaged
ASZ_275_0_0	CBIII_151				CB71.1.-.1	Damaged
ASZ_276_0_0	CBIII_152				CB71.1.-.1	Damaged

Table 14.67: Dossier (Group) ASZ 2 reference data

14.4.1.3 Series (Group) ASZ 3: CB III 154-157

This series comprise disbursement records CB III 154-157, a mere four records of disbursements of a particular type of beer. While a dating to REL 179 is maintained here, also because the series is generally hard to link managerially to any of the other three series considered here, it should be noted that a similar year name is employed for REL 198, much closer in time to the remainder of ASZ Dossier 1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_278_0_0	CBIII_154	30	1	179	CB35.1	Damaged
ASZ_279_0_0	CBIII_155	10	12	179	CB35.1	Complete
ASZ_280_0_0	CBIII_156	11	12	179	CB35.1	Fairly complete
ASZ_281_0_0	CBIII_157	15	12	179	CB35.1	Complete

Table 14.68: Dossier (Group) ASZ 3 reference data

14.4.1.4 Series (Group) ASZ 4: Beer allotments to individuals and visitors

This series comprise disbursement records CB III 158-198, a total 41 records of disbursements to various individuals, primarily officials and visitors. The texts record issues to a variable selection of people and groups, apparently all of a temporal nature. A few records list exceptionally large amounts of beer, namely CB III 162 (155 *qa*), CB III 167 (165 *qa*), CB III 180 (100 *qa*) and CB III 192 (175 *qa*). The overall average is considerably lower, however, namely close to 30 *qa* per record. The larger size of individual allotments may point either to issues for travelling envoys similar to what we could observe at Tuttul (see the discussion of flour and bread allotments in Chapter 7).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_282_0_0	CBIII_158	10	9	188	CB19.1.-.1	Complete
ASZ_283_0_0	CBIII_159	8	1	195	CB19.1.-.1	Complete
ASZ_284_0_0	CBIII_160	10	1	195	CB19.1.-.1	Complete
ASZ_285_0_0	CBIII_161	11	1	195	CB19.1.-.1	Complete
ASZ_286_0_0	CBIII_162	16	1	195	CB19.1.-.1	Complete
ASZ_287_0_0	CBIII_163	21	1	195	CB19.1.-.1	Complete
ASZ_288_0_0	CBIII_164	23	1	195	CB19.1.-.1	Complete
ASZ_289_0_0	CBIII_165	0	2	195	CB19.1.-.1	Complete
ASZ_290_0_0	CBIII_166	6	2	195	CB19.1.-.1	Complete
ASZ_291_0_0	CBIII_167	6	2	195	CB19.1.-.1	Complete
ASZ_292_0_0	CBIII_168	3	6	195	CB19.1.-.1	Complete
ASZ_293_0_0	CBIII_169	9	6	195	CB19.1.-.1	Complete
ASZ_294_0_0	CBIII_170	12	6	195	CB19.1.-.1	Complete
ASZ_295_0_0	CBIII_171	15	6	195	CB19.1.-.1	Complete
ASZ_296_0_0	CBIII_172	16	6	195	CB19.1.-.1	Complete
ASZ_297_0_0	CBIII_173	24	6	195	CB19.1.-.1	Complete

ASZ_298_0_0	CBIII_174	25	6	195	CB19.1.-.1	Complete
ASZ_299_0_0	CBIII_175	27	6	195	CB19.1.-.1	Complete
ASZ_300_0_0	CBIII_176	3	7	195	CB19.1.-.1	Complete
ASZ_301_0_0	CBIII_177	6	7	195	CB19.1.-.1	Fairly complete
ASZ_302_0_0	CBIII_178	14	7	195	CB19.1.-.1	Complete
ASZ_303_0_0	CBIII_179	19	7	195	CB19.1.-.1	Complete
ASZ_304_0_0	CBIII_180	19	7	195	CB19.1.-.1	Complete
ASZ_305_0_0	CBIII_181	23	7	195	CB19.1.-.1	Complete
ASZ_306_0_0	CBIII_182	27	7	195	CB19.1.-.1	Complete
ASZ_307_0_0	CBIII_183	28	7	195	CB19.1.-.1	Fairly complete
ASZ_308_0_0	CBIII_184	14	12	195	CB19.1.-.1	Complete
ASZ_309_0_0	CBIII_185	28	12	195	CB19.1.-.1	Complete
ASZ_310_0_0	CBIII_186	29	12	195	CB19.1.-.1	Complete
ASZ_311_0_0	CBIII_187	3	3	196	CB19.1.-.1	Complete
ASZ_312_0_0	CBIII_188	8	3	196	CB19.1.-.1	Complete
ASZ_313_0_0	CBIII_189	11	3	196	CB19.1.-.1	Complete
ASZ_314_0_0	CBIII_190	12	3	196	CB19.1.-.1	Fairly complete
ASZ_315_0_0	CBIII_191	16	3	196	CB19.1.-.1	Fairly complete
ASZ_316_0_0	CBIII_192	17	3	196	CB19.1.-.1	Complete
ASZ_317_0_0	CBIII_193	21	3	196	CB19.1.-.1	Complete
ASZ_318_0_0	CBIII_194	24	3	196	CB19.1.-.1	Complete
ASZ_319_0_0	CBIII_195	25	3	196	CB19.1.-.1	Complete
ASZ_320_0_0	CBIII_196	26	3	196	CB19.1.-.1	Complete
ASZ_321_0_0	CBIII_197	28	3	196	CB19.1.-.1	Fairly complete
ASZ_322_0_0	CBIII_198	2	4	196	CB19.1.-.1	Fairly complete

Table 14.69: Series (Group) ASZ 4 reference data

14.4.2 Dossier (Group) ASZ 2: Grain allotments

This dossier comprises various series of grain disbursement records extrapolated from the assemblage found in Mallowan's Area TD Room 106, and includes a total 56 texts. As an analytical group, the dossier includes all administrative records that can be meaningfully related to permanent elements of the institutional household infrastructure. While the dossier is not discussed on its own in the analytical chapters, it forms part of the basis for my definition of managerial sections given in Chapter 6. Related series are discussed with reference to their subject matter under the relevant headings, e.g. for workers and livestock, and part of this dossier underpins calculations on institutional scale given in Chapter 9.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_1_0_0	OBTCB_012	0	7	196	Area_TD_Room_106	Fairly complete
ASZ_2_0_0	OBTCB_013	1	6	196	Area_TD_Room_106	Complete
ASZ_4_0_0	OBTCB_015	0	10	196	Area_TD_Room_106	Complete
ASZ_5_0_0	OBTCB_016	0	11	196	Area_TD_Room_106	Complete
ASZ_10_0_0	OBTCB_021	0	7	196	Area_TD_Room_106	Complete

ASZ_11_0_0	OBTCB_022	1	4	196	Area_TD_Room_106	Complete
ASZ_13_0_0	OBTCB_024	0	7	196	Area_TD_Room_106	Complete
ASZ_15_0_0	OBTCB_026	10	3	196	Area_TD_Room_106	Complete
ASZ_16_0_0	OBTCB_027	1	6	196	Area_TD_Room_106	Complete
ASZ_18_0_0	OBTCB_029	0	12	196	Area_TD_Room_106	Complete
ASZ_19_0_0	OBTCB_030	10	3	196	Area_TD_Room_106	Complete
ASZ_23_0_0	OBTCB_034	0	12	196	Area_TD_Room_106	Complete
ASZ_28_0_0	OBTCB_039	0	12	196	Area_TD_Room_106	Complete
ASZ_29_0_0	OBTCB_040	0	9	196	Area_TD_Room_106	Complete
ASZ_31_0_0	OBTCB_042	0	8	196	Area_TD_Room_106	Complete
ASZ_33_0_0	OBTCB_044	0	7	196	Area_TD_Room_106	Complete
ASZ_40_0_0	OBTCB_051	0	4	196	Area_TD_Room_106	Complete
ASZ_42_0_0	OBTCB_053	10	3	196	Area_TD_Room_106	Complete
ASZ_43_0_0	OBTCB_054	0	7	196	Area_TD_Room_106	Fairly complete
ASZ_45_0_0	OBTCB_056	0	11	196	Area_TD_Room_106	Complete
ASZ_46_0_0	OBTCB_057	1	6	196	Area_TD_Room_106	Complete
ASZ_47_0_0	OBTCB_058	0	10	196	Area_TD_Room_106	Complete
ASZ_48_0_0	OBTCB_059	0	11	196	Area_TD_Room_106	Complete
ASZ_49_0_0	OBTCB_060	1	4	196	Area_TD_Room_106	Complete
ASZ_50_0_0	OBTCB_061	0	11	196	Area_TD_Room_106	Complete
ASZ_55_0_0	OBTCB_066	1	5	196	Area_TD_Room_106	Complete
ASZ_56_0_0	OBTCB_067	0	6	196	Area_TD_Room_106	Fairly complete
ASZ_59_0_0	OBTCB_070				Area_TD_Room_106	Fairly complete
ASZ_61_0_0	OBTCB_072	1	5	196	Area_TD_Room_106	Fairly complete
ASZ_62_0_0	OBTCB_073	3	10	193	Area_TD_Room_106	Complete
ASZ_64_0_0	OBTCB_075			196	Area_TD_Room_106	Fairly complete
ASZ_67_0_0	OBTCB_078	0	2	0	Area_TD_Room_106	Fairly complete
ASZ_68_0_0	OBTCB_079	0	1	192	Area_TD_Room_106	Complete
ASZ_69_0_0	OBTCB_080	0	3	196	Area_TD_Room_106	Complete
ASZ_70_0_0	OBTCB_081	0	4	196	Area_TD_Room_106	Damaged
ASZ_71_0_0	OBTCB_082				Area_TD_Room_106	Damaged
ASZ_74_0_0	OBTCB_085	0	5	196	Area_TD_Room_106	Damaged
ASZ_75_0_0	OBTCB_086	0	5	196	Area_TD_Room_106	Complete
ASZ_77_0_0	OBTCB_088				Area_TD_Room_106	Fairly complete
ASZ_80_0_0	OBTCB_091				Area_TD_Room_106	Fairly complete
ASZ_82_0_0	OBTCB_093				Area_TD_Room_106	Fairly complete
ASZ_83_0_0	OBTCB_094				Area_TD_Room_106	Damaged
ASZ_84_0_0	OBTCB_096				Area_TD_Room_106	Damaged
ASZ_88_0_0	OBTCB_102				Area_TD_Room_106	Damaged
ASZ_89_0_0	OBTCB_103				Area_TD_Room_106	Damaged
ASZ_90_0_0	OBTCB_106				Area_TD_Room_106	Damaged
ASZ_107_0_0	OBTCB_108				Area_TD_Room_106	Damaged
ASZ_91_0_0	OBTCB_111	0	6	196	Area_TD_Room_106	Damaged
ASZ_92_0_0	OBTCB_112				Area_TD_Room_106	Damaged
ASZ_93_0_0	OBTCB_113				Area_TD_Room_106	Damaged
ASZ_95_0_0	OBTCB_115				Area_TD_Room_106	Damaged
ASZ_96_0_0	OBTCB_118				Area_TD_Room_106	Damaged
ASZ_97_0_0	OBTCB_119				Area_TD_Room_106	Damaged
ASZ_98_0_0	OBTCB_120				Area_TD_Room_106	Damaged

ASZ_99_0_0	OBTCB_121				Area_TD_Room_106	Damaged
ASZ_100_0_0	OBTCB_124				Area_TD_Room_106	Damaged

Table 14.70: Dossier (Group) ASZ 2 reference data

14.4.2.1 Series (Group) ASZ 5: Workshop grain allotments

This series comprises nine catalogue numbers of which seven (OBTCB 81, 82, 88, 102, 112, 113, 115, and 120) are damaged and only two (OBTCB 12 and 88) are fairly complete. All relate to grain issued for individuals associated with the workshops (Akk. *nepārum*) and related activities (summarised in Talon 1997, 24-29). The most extensive of these records, OBTCB 12, is included in ASZ Sample 1 (see below).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_1_0_0	OBTCB_012	0	7	196	Area_TD_Room_106	Fairly complete
ASZ_70_0_0	OBTCB_081	0	4	196	Area_TD_Room_106	Damaged
ASZ_71_0_0	OBTCB_082				Area_TD_Room_106	Damaged
ASZ_77_0_0	OBTCB_088				Area_TD_Room_106	Fairly complete
ASZ_88_0_0	OBTCB_102				Area_TD_Room_106	Damaged
ASZ_92_0_0	OBTCB_112				Area_TD_Room_106	Damaged
ASZ_93_0_0	OBTCB_113				Area_TD_Room_106	Damaged
ASZ_95_0_0	OBTCB_115				Area_TD_Room_106	Damaged
ASZ_98_0_0	OBTCB_120				Area_TD_Room_106	Damaged

Table 14.71: Series (Group) ASZ 5 reference data

14.4.2.2 Series (Group) ASZ 6: Palace grain allotments

This series comprises four texts listing grain allotments for personnel and residents of the palace (Akk. *ekallum*) (Talon 1997, 30-31). A complete type example, OBTCB 80, is included in ASZ Sample 1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_56_0_0	OBTCB_067	0	6	196	Area_TD_Room_106	Fairly complete
ASZ_64_0_0	OBTCB_075			196	Area_TD_Room_106	Fairly complete
ASZ_69_0_0	OBTCB_080	0	3	196	Area_TD_Room_106	Complete
ASZ_75_0_0	OBTCB_086	0	5	196	Area_TD_Room_106	Complete

Table 14.72: Series (Group) ASZ 6 reference data

14.4.2.3 Series (Group) ASZ 7: Grain allotments of the House of Šubat-Enlil

This series comprises eight texts listing grain disbursements for the House of Šubat-Enlil (Akk. *bīt Šubat-Enlil*) (Talon 1997, 32-33). This structure apparently constituted a secondary estate parallel to e.g. Qarni-Lim's Palace at Šehnā. The number of documents related to its upkeep suggest it to be a permanent institution within the settlement. A type example, OBTCB 78, is included in ASZ Sample 1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_62_0_0	OBTCB_073	3	10	193	Area_TD_Room_106	Complete
ASZ_67_0_0	OBTCB_078	0	2	0	Area_TD_Room_106	Fairly complete
ASZ_68_0_0	OBTCB_079	0	1	192	Area_TD_Room_106	Complete
ASZ_80_0_0	OBTCB_091				Area_TD_Room_106	Fairly complete
ASZ_82_0_0	OBTCB_093				Area_TD_Room_106	Fairly complete
ASZ_84_0_0	OBTCB_096				Area_TD_Room_106	Damaged
ASZ_89_0_0	OBTCB_103				Area_TD_Room_106	Damaged
ASZ_107_0_0	OBTCB_108				Area_TD_Room_106	Damaged

Table 14.73: Series (Group) ASZ 7 reference data

14.4.2.4 Series (Group) ASZ 8: Grain allotments for agricultural managers

The two texts included in this series record grain rations for agricultural managers (Sum. engar) and their people (Talon 1997, 34). A type example, OBTCB 66, is included in ASZ Sample 1, and I further discuss the general role of agricultural workers with reference also to these texts in Chapter 7.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_55_0_0	OBTCB_066	1	5	196	Area_TD_Room_106	Complete
ASZ_59_0_0	OBTCB_070				Area_TD_Room_106	Fairly complete

Table 14.74: Series (Group) ASZ 8 reference data

14.4.2.5 Series (Group) ASZ 9: Grain allotment for herders

This series comprises four texts listing grain rations for herders tending to livestock (Talon 1997, 34). A type example, OBTCB 51, is included in ASZ Sample 1. While I do not discuss the responsibilities of this type of personnel in much detail, I touch on herding practices in Chapter 8.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_13_0_0	OBTCB_024	0	7	196	Area_TD_Room_106	Complete
ASZ_29_0_0	OBTCB_040	0	9	196	Area_TD_Room_106	Complete
ASZ_31_0_0	OBTCB_042	0	8	196	Area_TD_Room_106	Complete
ASZ_40_0_0	OBTCB_051	0	4	196	Area_TD_Room_106	Complete

Table 14.75: Series (Group) ASZ 9 reference data

14.4.2.6 Series (Group) ASZ 10: Grain allotments for textile workers

This series comprises eight damaged texts (OBTCB 85, 94, 106 111, 118, 119, 121, and 124). Of these, OBTCB 85 allows for an almost complete reconstruction when complemented by the remaining fragments (see discussion in Talon 1997, 17-23). The latter text is included in ASZ Sample 1, and appears in my discussion of grain ration sizes in Chapter 7. Note also comments on the inclusion of this particular document in calculations of institutional scale given in Chapter 10.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_74_0_0	OBTCB_085	0	5	196	Area_TD_Room_106	Damaged
ASZ_83_0_0	OBTCB_094				Area_TD_Room_106	Damaged
ASZ_90_0_0	OBTCB_106				Area_TD_Room_106	Damaged
ASZ_91_0_0	OBTCB_111	0	6	196	Area_TD_Room_106	Damaged
ASZ_96_0_0	OBTCB_118				Area_TD_Room_106	Damaged
ASZ_97_0_0	OBTCB_119				Area_TD_Room_106	Damaged
ASZ_99_0_0	OBTCB_121				Area_TD_Room_106	Damaged
ASZ_100_0_0	OBTCB_124				Area_TD_Room_106	Damaged

Table 14.76: Series (Group) ASZ 10 reference data

14.4.2.7 Series (Group) ASZ 11: Grain fodder for plough oxen

The three texts comprised in this series record fodder for plough oxen (Talon 1997, 33), discussed in detail in 8.1.1.1. A type example, OBTCB 60, is included in ASZ Sample 2. Data from this series is included in calculations on tillage capacity in 9.3.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_42_0_0	OBTCB_053	10	3	196	Area_TD_Room_106	Complete
ASZ_46_0_0	OBTCB_057	1	6	196	Area_TD_Room_106	Complete
ASZ_49_0_0	OBTCB_060	1	4	196	Area_TD_Room_106	Complete

Table 14.77: Series (Group) ASZ 11 reference data

14.4.2.8 Series (Group) ASZ 12: Grain fodder for fattening house

The two texts included in this series record fodder for livestock in the fattening house, particularly rams and cattle (Talon 1997, 33). These are discussed in 8.7, together with comparable examples from Tuttul (TUT Series 3). A type example, OBTCB 30, is included in ASZ Sample 2.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_19_0_0	OBTCB_030	10	3	196	Area_TD_Room_106	Complete
ASZ_33_0_0	OBTCB_044	0	7	196	Area_TD_Room_106	Complete

Table 14.78: Series (Group) ASZ 12 reference data

14.4.2.9 Series (Group) ASZ 13: Grain fodder for pigs

The three texts included in this series record grain fodder for a drove of pigs (Talon 1997, 34). A type example, OBTCB 54, is included in ASZ Sample 2. The series appears in discussions of pig husbandry in 8.4.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_23_0_0	OBTCB_034	0	12	196	Area_TD_Room_106	Complete
ASZ_43_0_0	OBTCB_054	0	7	196	Area_TD_Room_106	Fairly complete

ASZ_45_0_0	OBTCB_056	0	11	196	Area_TD_Room_106	Complete

Table 14.79: Series (Group) ASZ 13 reference data

14.4.2.10 Series (Group) ASZ 14: Grain fodder for pack donkeys

This series comprises four texts recording fodder for pack donkeys (Talon 1997, 33). OBTCB 16 is included as a type example in ASZ Sample 2, while the series appears in my discussion of equids in 8.8.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_4_0_0	OBTCB_015	0	10	196	Area_TD_Room_106	Complete
ASZ_5_0_0	OBTCB_016	0	11	196	Area_TD_Room_106	Complete
ASZ_10_0_0	OBTCB_021	0	7	196	Area_TD_Room_106	Complete
ASZ_16_0_0	OBTCB_027	1	6	196	Area_TD_Room_106	Complete

Table 14.80: Series (Group) ASZ 14 reference data

14.4.2.11 Series (Group) ASZ 15: Grain fodder for equids

Two texts are included in this series, though with some variation in format (Talon 1997, 33). Both concern supplementary grain fodder for the same group of equids. OBTCB 72 is included in ASZ Sample 2. The series itself is discussed in 8.8.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_11_0_0	OBTCB_022	1	4	196	Area_TD_Room_106	Complete
ASZ_61_0_0	OBTCB_072	1	5	196	Area_TD_Room_106	Fairly complete

Table 14.81: Series (Group) ASZ 15 reference data

14.4.2.12 Series (Group) ASZ 17: Grain allotments for grooms

Grain allotments for grooms overseen by trainers are listed in the two records included in this series (also Talon 1997, 33). OBTCB 61 appears in ASZ Sample 1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_28_0_0	OBTCB_039	0	12	196	Area_TD_Room_106	Complete
ASZ_50_0_0	OBTCB_061	0	11	196	Area_TD_Room_106	Complete

Table 14.82: Series (Group) ASZ 17 reference data

14.4.2.13 Series (Group) ASZ 18: Grain for birds and gazelles

This series comprises four texts. The supervisory entity in receipt of fodder for geese (Sum. mušen-gal) and gazelles (Sum. maš-da3) is a certain E'ellanum. The same individual appears as the managing authority of the palace courtyard sweepers (Akk. *kisalluhātu*) in the palace ration records (ASZ 6 Series), and so we may assume the animals in question to be kept in the same area (Talon 1997, 34, Rattenborg 2012, 38-39). A type example, OBTCB 58, is included in ASZ Sample 2. I discuss the series in relation to bird keeping in 8.5.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_15_0_0	OBTCB_026	10	3	196	Area_TD_Room_106	Complete
ASZ_18_0_0	OBTCB_029	0	12	196	Area_TD_Room_106	Complete
ASZ_47_0_0	OBTCB_058	0	10	196	Area_TD_Room_106	Complete
ASZ_48_0_0	OBTCB_059	0	11	196	Area_TD_Room_106	Complete

Table 14.83: Series (Group) ASZ 18 reference data

14.4.3 Dossier (Group) ASZ 4: Cattle inventories

The cattle inventories of Ašnakkum include four accounts of cattle holdings (OBTCB 68, 69, 76, and 77). These four records likely all relate to an inventory of cattle herds made on the same day in mid-spring of the same year (Talon 1997, 33, van Koppen 2000, 339, Rattenborg 2012, 43-46). The main document is OBTCB 68, listing breeding herds and calves. OBTCB 69 accounts for head entrusted to the fatteners, OBTCB 76 for head dispatched to other locations or given as gifts, and OBTCB 77 for head lost or given in exchange (Akk. *pūhtu*) for others (see 8.1.3).

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_57_0_0	OBTCB_068	14	8	194	Area_TD_Room_106	Fairly complete
ASZ_58_0_0	OBTCB_069	14	8	194	Area_TD_Room_106	Complete
ASZ_65_0_0	OBTCB_076	14	8	194	Area_TD_Room_106	Fairly complete
ASZ_66_0_0	OBTCB_077				Area_TD_Room_106	Damaged

Table 14.84: Dossier (Group) ASZ 4 reference data

14.4.4 Sample (Group) ASZ 1: Grain allotments

To reconstruct annual levels of cereal consumption at Ašnakkum, type examples from all series within ASZ Dossier 2 have been combined in two sample groups. The first of these includes examples from ASZ Series 5 (workshops), ASZ Series 6 (palace household), ASZ Series 7 (the House of Šubat-Enlil), ASZ Series 8 (agricultural managers), ASZ Series 9 (herders), ASZ Series 10 (textile workers), ASZ Series 17 (grooms). Taking complete or fairly complete exemplars from each series, ASZ Sample 1 then provides an approximate overview of all attested unique individuals in receipt of grain allotments. The sample forms the basis for discussions of grain ration sizes in Chapter 7 and, together with ASZ Sample 2, for calculations on institutional scale in 9.1.2.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessmemt
ASZ_1_0_0	OBTCB_012	0	7	196	Area_TD_Room_106	Fairly complete
ASZ_40_0_0	OBTCB_051	0	4	196	Area_TD_Room_106	Complete
ASZ_50_0_0	OBTCB_061	0	11	196	Area_TD_Room_106	Complete
ASZ_55_0_0	OBTCB_066	1	5	196	Area_TD_Room_106	Complete

ASZ_67_0_0	OBTCB_078	0	2	0	Area_TD_Room_106	Fairly complete
ASZ_69_0_0	OBTCB_080	0	3	196	Area_TD_Room_106	Complete
ASZ_74_0_0	OBTCB_085	0	5	196	Area_TD_Room_106	Damaged

Table 14.85: Sample (Group) ASZ 1 reference data

14.4.5 Sample (Group) ASZ 2: Grain fodder

This sample group was formulated through the same principle as that of ASZ Sample 1, but here focused on grain fodder disbursements. The sample includes six texts relating to livestock taken from series contained in ASZ Dossier 2. These are ASZ Series 11 (plough oxen), ASZ Series 12 (fattening house), ASZ Series 13 (pigs), ASZ Series 14 (pack donkeys), ASZ Series 15 (equids), and ASZ Series 18 (birds and gazelles). Together with ASZ Sample 1, this sample forms the basis for my discussion of institutional scale in 9.1.2.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
ASZ_19_0_0	OBTCB_030	10	3	196	Area_TD_Room_106	Complete
ASZ_43_0_0	OBTCB_054	0	7	196	Area_TD_Room_106	Fairly complete
ASZ_5_0_0	OBTCB_016	0	11	196	Area_TD_Room_106	Complete
ASZ_61_0_0	OBTCB_072	1	5	196	Area_TD_Room_106	Fairly complete
ASZ_47_0_0	OBTCB_058	0	10	196	Area_TD_Room_106	Complete
ASZ_49_0_0	OBTCB_060	1	4	196	Area_TD_Room_106	Complete

Table 14.86: Sample (Group) ASZ 2 reference data

15 Šehnā or Šubat-Enlil (Tall Līlān)

Tall Līlān (Leilan) lies in the eastern reaches of the Khabūr Basin within the present-day Syrian Arab Republic. The site constitutes a 15 ha high mound on the left bank of the Wādī Jarrah, with the summit towering some 20 metres above the plain. The high mound is surrounded by a vast lower settlement with a walled perimeter encompassing a total 90 ha (Ristvet and Weiss 2012, 229-230). Long known and recognised among archaeologists as one of the principal urban settlements in the Jazīrah, the ancient name of the site was variously Šehnā and, during the reign of Šamšī-Adad in the early 18th century BCE, also Šubat-Enlil ("the dwelling of Enlil") (Eidem 2008a, 269 with further references). Under the former name, the city appears also in Old Akkadian (ca. 2300 BCE) texts from Tall Brak further to the southwest (e.g. Eidem *et al.* 2001, 106-107).

Figure 15.91: Šehnā or Šubat-Enlil (Tall Līlān) from Corona 1105 (November 1968) and CNES/Atrium & Google Earth (October 2013)

Līlān encompasses a long occupational sequence spanning some three millennia (for a recent summary overview, see Weiss 2013). The earliest levels date to the Halaf Period (6th millennium BCE), yet the main period of occupation, at which the site grew beyond the high mound falls in the middle of the 3rd millennium BCE (Leilan Period IIId – IIb). After a settlement hiatus towards the end of the Early Bronze Age (Leilan Period IId ca. 2200-1900 BCE), the settlement regained importance, acting as one of the chief political centres of the northern Jazīrah during the Middle Bronze Age (Leilan Period I ca. 1900-1700 BCE). The site was finally abandoned towards the end of this period, concurrent with a more general population decline.

Like Ašnakkum, the wider hinterland of Šehnā straddles a distinct mosaic of ecozones. The slopes of the Tur Abdin less than 20 km to the north descend into the rolling plains, with a gradual drop in precipitation as one moves south. Nearby watercourses originate in the former massif, and converge on the marshes of al-Radd a day's journey below Šehnā. Beyond this wetland lies the Jabal Sinjār. While precipitation just below the northern mountain range averages more than 400 mm per year, rainfall in the desertic zone around al-Radd is considerably lower, just above 200 mm. Soil regimes reflect this state of affairs, with luvisols to the north and gypsic calcisols further south (Courty and Weiss 1997, 110-112). This variety of environmental profiles, coupled with basaltic plateaus to the east, likely diversified patterns of settlement and land use also in the Middle Bronze Age (Ristvet 2005, 45-47).

15.1 Excavation history

Excavations at Tall Līlān have been conducted by Yale University since 1978, and focus primarily on the extensive Early and Middle Bronze Age levels, which includes the walled lower town area (see for a good overview e.g. www.leilan.yale.edu). The first years of archaeological investigations, from 1978-85, focused primarily on the high mound, or acropolis, where excavations have exposed sizeable monumental structures dating to the mid-to-late third millennium BCE (Acropolis NW, Operation 1). Following an apparent settlement hiatus in the last centuries of the Early Bronze Age, an extensive Old Babylonian temple complex dating to Leilan Period I (ca. 1900-1700 BCE) has been exposed on the eastern side of the mound (Acropolis NE), with a second phase affirmatively related, through epigraphic and glyptic finds, to Šamšī-Adad, thus ca. 1800-1775 BCE. Secondary renovations of the same building can be associated with the later kings of the Land of Apum (Ristvet and Weiss 2012, 230-232).

On the lower part of the site, more recent excavations have focused on the exposure of large monumental structures and investigations of the city wall. The latter constitutes in fact two discrete structures. The first, and most substantial is associated with the expansion of the Early Bronze Age city in the mid-3rd millennium BCE with a second and substantial refurbishment carried out in the Middle Bronze Age (Ristvet 2007, 191-192). The latter phase can be linked to the construction of the Old Babylonian temple on the high mound based on similarities in construction practices (Weiss *et al.* 1990, 554). Domestic structures dating to the second half of the 3rd millennium BCE were exposed in 1989 over 600 m^2 in the southeast part of the lower town (Operation 5), and, significantly, produced no discernible structures of a later date (Weiss 1990, 201).

Two palatial structures dating to Leilan Period I have been partly exposed on the lower mound. One is the extensive Lower Town East Palace (Operation 3), where excavations in 1985 and 1987 exposed a 1000 m^2 transect of a complex suggested to have covered around one hectare in total (Ristvet and Weiss 2012, 232). A 325 m^2 transect of another structure, variably referred to as the Lower Town North Palace or the Qarni-Lim Palace (Operation 7) was exposed further to the north in 1991. This building constitutes a later Period 1 palatial complex dated, through textual finds, to the mid-18th century BCE (Akkermans *et al.* 1991). Both buildings appear to have been built on the levelled remains of late 3rd millennium BCE structures (Weiss *et al.* 1990, 543, Akkermans *et al.* 1991, 69).

15.1.1 The extent of the Middle Bronze Age settlement

The extent of the Middle Bronze Age settlement remains a topic of some debate. The relatively low suggested population density of the site in the Middle Bronze Age II (e.g. Ristvet and Weiss 2013, 265-267) centres on the predominantly monumental nature of structures exposed. It should be noted, however, that domestic housing areas dating to Period I have indeed been attested in the lower town (see e.g. conclusions by Stein in Weiss *et al.* 1990, 555). Several authors have proposed to view 18th century BCE Šehnā as a 'hollow city' or 'disembedded capital' (e.g. Akkermans *et al.* 1991, Eidem 2000, 264, Ristvet and Weiss 2013, 265, on the general application of this concept to Middle Bronze Age settlements in the Jazīrah, see Oates 1985, also especially Joffe 1998). The underlying societal assumptions, notably the implied functional relationship between largely ceremonial political capitals and densely populated smaller settlements are, however, rarely scrutinised (see e.g. critique by Smith 2003, 203-204).

The huge temple complex on the eastern side of the main mound (Acropolis NE) surely suggests some substantial level of occupation at this part of the site, though no structures pre-dating the late third millennium complex (Operation 1) further to the west were found (Ristvet and Weiss 2012, 231). Below the hill, survey of the southern lobe of the walled lower town, an area that extends over some 10 ha, retrieved Period I and II ceramics, notably Khabūr Ware. Excavators have suggested this area to constitute the remains of a single-period occupation dating to the 19-18th century BCE, perhaps linked to Old Assyrian traders (Weiss *et al.* 1990, 534-535, Ristvet 2005, 116). Excavations conducted in 1991 in the western part of this area (Operation 6) failed to produce Middle Bronze Age material, however (Pulhan 2000, 3, see also Eidem 2008b, 35). Initial surface collection conducted in random transects across 5% of the total site surface in 1978 retrieved substantial amounts of Khabūr Ware, generally pointing to a settlement of some significance in the first centuries of the 2nd millennium BCE (Weiss 1982, 226).

Without offering further detail, Ristvet has suggested a total settled area of some 35 ha for the Middle Bronze Age city, divided between an approximate 10 ha high mound and a 25 ha section of the northeast part of the lower mound, excluding the south lobe previously mentioned (Ristvet 2008, Fig. 3a, also Ristvet and Weiss in Eidem 2011a, Fig. 1). Compared to the estimated 75 ha settlement of the latter 3rd millennium BCE, this constitutes a significant reduction (Weiss 1990, 194). The Middle Bronze Age settlement then includes the areas around the 18th century BCE palace of Šamšī-Adad (Operation 3), the later estate of Qarni-Lim further north (Operation 7), the domestic housing proximal to the city wall (Operation 4) and most of the high mound with the contemporary temple complex (Acropolis NE). One may further note Eidem's survey of sources pertaining to traders' quarters, which would have taken up space also (Eidem 2008b, 35).

15.2 Regional surveys

The region around Tall Līlān has been intensively surveyed as part of on-going work at the site itself. Early work in 1984 investigated the hinterland in a 15 km radius from the site with random collection of pottery (Weiss 1986). A later survey (1987) of the same area by Stein and Wattenmaker employed systematic sampling of select transects on each site and intensive fieldwalking along the Wādī Jarrah (Stein and Wattenmaker 1990). Two later seasons, 1995 and 1997, witnessed a much more ambitious programme, with systematic survey covering a 30 km wide transect running north to south from the Turkish to the Iraqi border, though with some limitations to the area south of al-Radd. The Leilan Regional Survey (LRS), as it is generally referred to, further included the use of more accurate maps, SPOT imagery, and employed a fine-grained methodology for the investigation of located sites, including geoarchaeological investigations and sample excavations at selected sites (Ristvet 2005, 36).

Further beyond, Meijer surveyed northern parts of the LRS zone in the late 1970ies in the course of his investigations of the eastern Khabūr Basin, documenting close to 300 sites (Meijer 1986). Investigations of some fifty sites on the lower banks of the Wādī Jaghjagh, northeast of Tall Brak, were carried out by Eidem and Warburton (1996, complementing earlier work by Fielden 1979). Apart from the more recent survey of the Hamūkār hinterland further east on the Iraqi border, this exhausts available survey datasets for the eastern Khabūr Basin (cf. Quenet 2011, 19-22).

The survey dataset utilised here (Figure 15.92) has been adapted, with a few modifications, from Ristvet's doctoral dissertation on Šehnā and its hinterland during the Bronze Age (Ristvet 2005). Settled areas for Līlān (LRS 1) and Tall Muhamad Diyab (LRS 55) have been reduced in accordance with observations given for the relevant settlement phase. I have further excluded seasonal encampments identified by Ristvet (sites with less than five sherds, cf. Ristvet 2005, 121 and Fig. 124.124). For the Middle Bronze Age (LRS Phase 7 ca. 1900-1700 BCE), settlement patterns within the regional survey demonstrate a plethora of sites, 157 total, of which more than 75% were villages and hamlets smaller than 5 ha. This follows upon a period of almost complete regional abandonment (LRS Phase 6, ca. 2200-1900 BCE), at least within the LRS survey area, and the preceding, much more nucleated Early Bronze Age settlement distribution (Ristvet 2005, 120-123). Employing probabilistic analysis, Ristvet has suggested that only close to 30 of these sites would have been inhabited at any one time during this period, and further recognises a substantial number of potential pastoral encampments, which suggests an emphasis on nomadic lifestyle and livestock pasture, especially in basalt uplands and in the drier southern parts of the survey area. The few larger sites inhabited during LRS Phase 7 counted, apart from Šehnā itself (estimated at ca. 35 ha), also Tall Farfara (90 ha), Tall Muhamad Diyab (35 ha) and Tall Aid (20 ha). The relatively high aggregate settlement area observed for the eastern Khabūr should be considered in light of the almost deserted region further west (Wilkinson 2002).

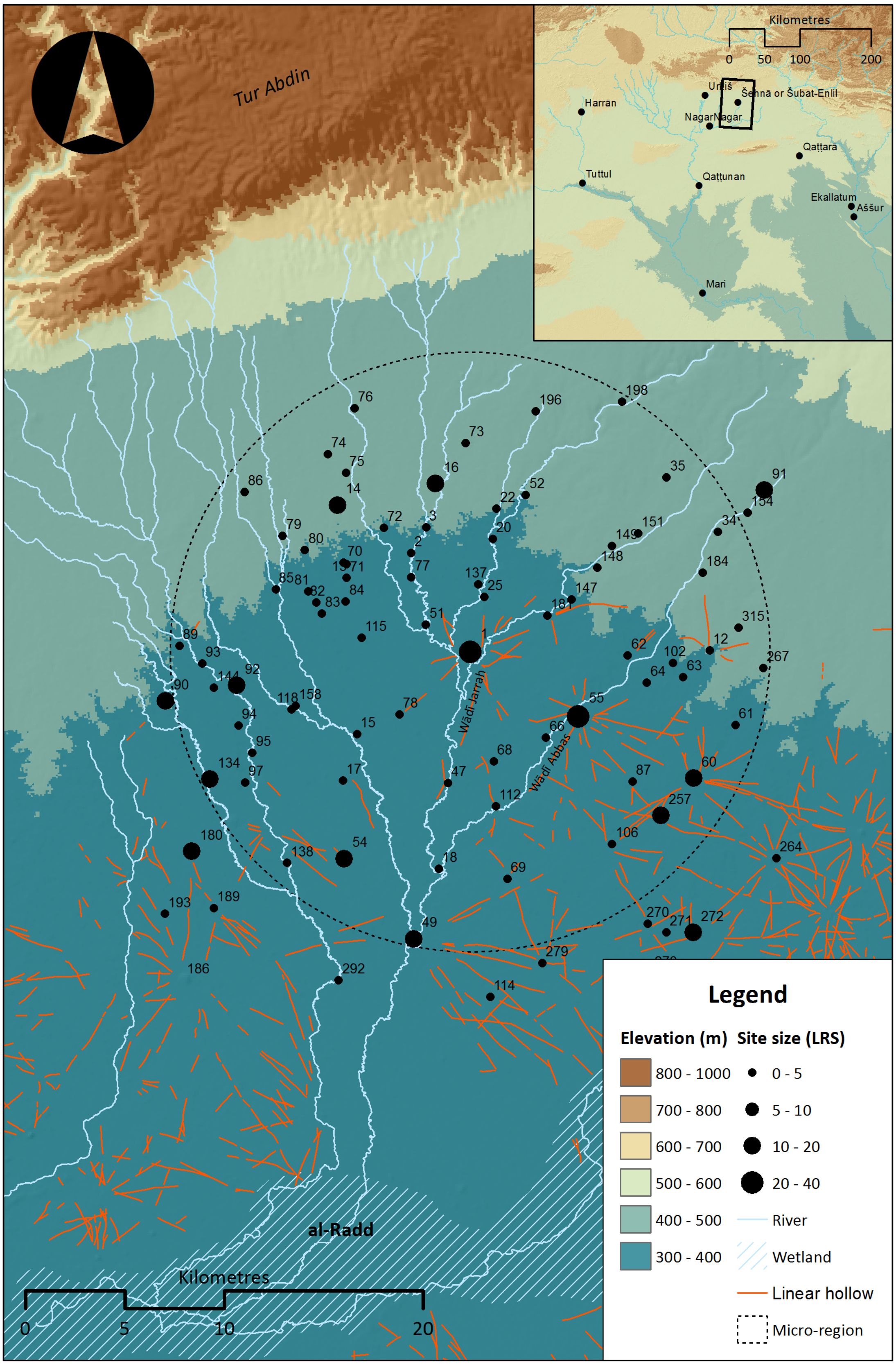


Figure 15.92: Šehnā (LRS 1) and associated Middle Bronze Age micro-region

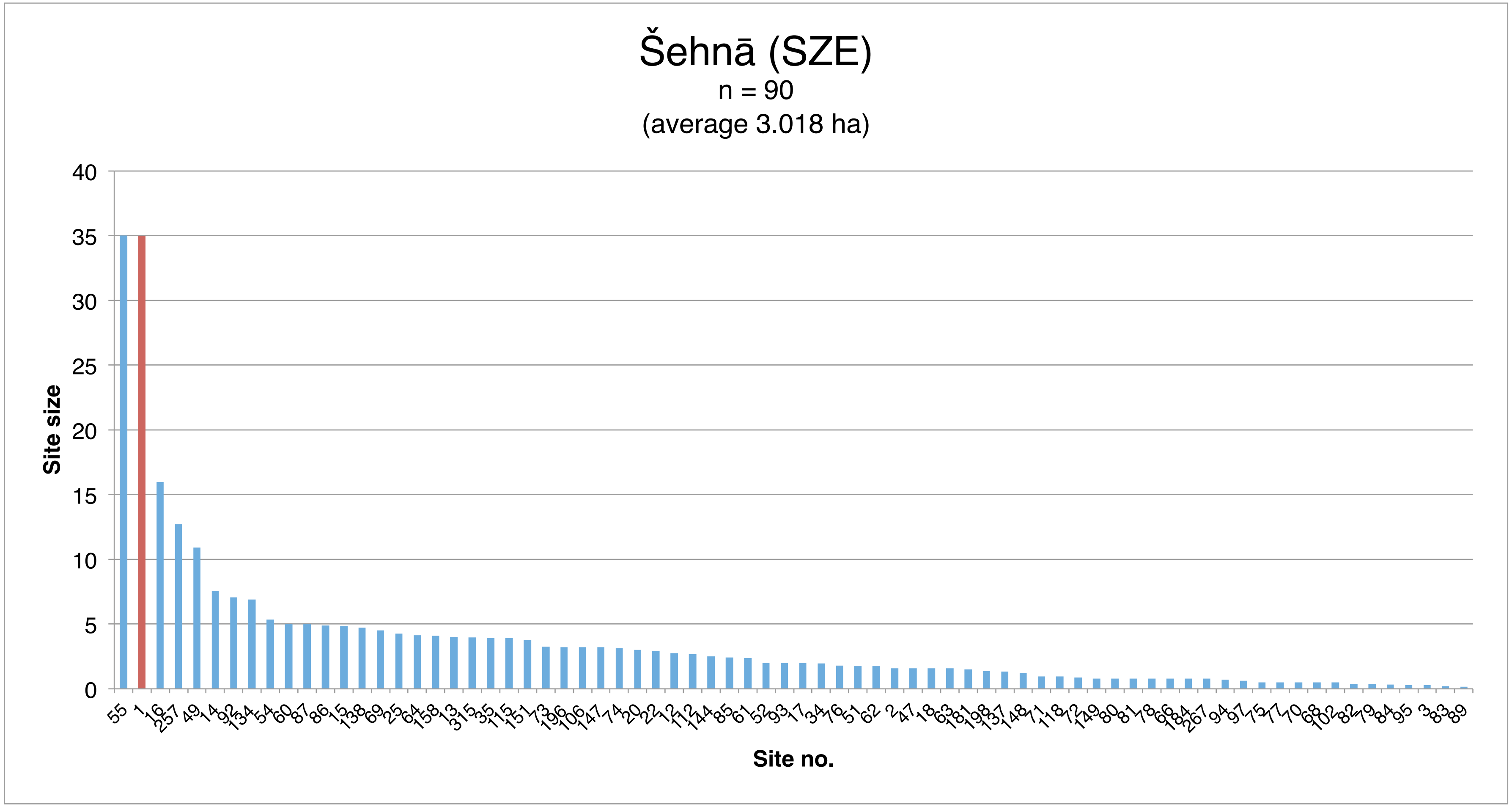


Figure 15.93: Histogram of Middle Bronze Age settlements within the Šehnā micro-region

Extensive bodies of source material relating to the historical geography of the land of Šehnā are available, namely from Mari on the Middle Euphrates, from localised textual finds, notably Šehnā itself, but also from Ašnakkum and elsewhere, and finally from itineraries found further afield, e.g in Old Assyrian correspondence (for the Jazīrah and adjoining regions more generally, see index in Charpin and Ziegler 2003, 272-276). The pertinent references have been recently surveyed by Eidem (2011a, 22-26), and a brief summary will suffice here.

15.2.1 The Land of Apum

During the Middle Bronze Age, the Khabūr Basin was commonly divided into two fairly distinct regions, namely the Ida-Maraṣ (“flanks of the arduous” or “difficult”, a reference to the slopes of the Tur Abdin) west of the Wādī Jaghjagh, and the *māt Apum* (“land of reeds”, in reference to the marshes of al-Radd) around Šehnā (Eidem 2011a, 22). Limiting the present overview to the latter area, this locale centred on the city of Šehnā, with Azamhul, tentatively identified with Tall Muhammad Diyab some 5 km to the southeast a second important site (Charpin 1990a, but see Eidem 2008a, 270 for a critique). A city named Apum, progenitor of the regional name, evidently formed one important station on the Old Assyrian trading route. Since Tall ’Aid (LRS 90) located some 15 km due west of Šehnā is the only site of any significance within the LRS survey that remained inhabited through the first hundred years of the 2nd millennium BCE, Eidem has advanced a tentative association of this site with the city of Apum (Eidem 2008b, 32-33). Tall Farfara, 20 km to the southwest has been estimated to cover some 90 ha at this time, and evidently became an important settlement during the mid-2nd millennium Mitanni period (Ristvet and Weiss 2013, 268). Attempts to identify its historical cognate in Middle Bronze Age textual sources has, however, proven largely inconclusive, with some suggesting the site to be 18th century BCE Ilān-ṣurā (Eidem 2011a, 25-26 with further references).

15.3 Textual sources

The site of Tall Līlān has yielded approximately 1,425 cuneiform tablets, the vast majority from the Middle Bronze Age II, through continued excavations over the last three decades. Initial textual finds from the 1985 season of excavations were summarily presented by Whiting (Weiss *et al.* 1990, 568-579), and by Eidem for the 1987 finds (Eidem 1991). Tablets from the Middle Bronze Age Qarni-Lim Palace were found in 1991 (van de Mieroop 1994). It will be convenient first to distinguish between textual finds from the high mound and from the surrounding lower part of the site respectively. Finds from the former area includes a small body of late 3rd millennium BCE administrative cuneiform texts (edited and published by Milano in de Lillis Forrest *et al.* 2007) from sections of a structure on the high mound excavated in 2002. This batch comprises 22 tablets and fragments, primarily administrative, but also with a few school exercises. None of the Middle Bronze Age tablets retrieved from the high mound have been edited in full, but an inventory is supplied by Whiting, and deserves some brief comments (Weiss *et al.* 1990, 575-579 and Table 572). Excluding seal impressions, Middle Bronze Age textual finds from the 1985 investigations of the high mound number 113 catalogue entries, divided into 77 administrative records, 2 letters, one school text, 25 unknown specimens and seven fragmentary pieces. The time range covered by dated administrative texts spans the eponymal sequence REL 176-202, with the bulk of the texts falling around REL 198-202 (the former range thus 1797-1771 BCE). While a good deal of summative information is given in Whiting's review of this assemblage, it will not be discussed further here.

Investigations of the Eastern Lower Town Palace (Operation 3) over two seasons in 1985 and 1987 have produced the largest corpus of Middle Bronze Age cuneiform tablets from the Jazīrah, totalling more than 600 individual texts. As recently summarised by Eidem, the assemblage includes 219 letters and at least 5 treaties (published in Eidem 2011a), c. 469 administrative texts (336 of which have been published in Ismail 1991, and Vincente 1991) along with c. 125 fragments, and finally a rendition of the Sumerian King List (Vincente 1995). The publication history relates only in part to excavation context. The two publications of administrative texts included all dated texts from the administrative corpus (thus leaving aside some 130 tablets either not dated or in a damaged state), and further appears to have been confined to lots excavated in 1987, while leaving aside texts found in the same location in 1985. The edition of the letters, similarly, does not include L85-129 found in Courtyard 5, the only letter retrieved during the 1985 season. If assuming the lot from 1985 not to be included in the above summary given by Eidem, we should add a further 25 texts to the total, comprising 23 administrative texts, one letter, and an envelope fragment (as extrapolated from Weiss *et al.* 1990, 575-579 and Table 572).

To define the original archival context of these assemblages, let us look briefly at find spot and dating range. As observed by Eidem, the textual assemblage stems from two primary locations, firstly Room 2, a small compartment that opened onto Courtyard 20, secondly sections further east that housed the massive collection of texts, letters, and treaties. These were found primarily in Room 22, but with joins retrieved from across Room 17, 22, and 23. The latter assemblage was evidently stored on an upper storey, and dispersed when the building collapsed (Eidem 2008a, 276). The 65 out of 85 administrative texts from Room 2 that maintain a year name provide a time range spanning the years REL 231-241 (REL 231-232 can be dated anywhere between 1746 and 1738 BCE, while REL 241 equals 1732 BCE). The texts from Rooms 17, 22, and 23 nominally span a longer set of years, but this can be narrowed considerably upon closer inspection. The tablet from REL 216 is one of only two from Room 23, and further an oddity as it is a rare example of the disbursement of cattle (at least ten head, in this particular case), rather than the usual receipt of cattle as a gift, as seen e.g. in Vincente 1991, Text 70. The vast majority of texts from the assemblage spread in Room 17, 22, and 23 dates to a narrower time range, namely REL 223-226, with only one dated text for, respectively, the years 228, 232, 239, and 240. In absolute chronological terms, we obtain then an approximate time range for this archive between 1750-1747 BCE.

The excavations of the Qarni-Lim Palace (Operation 7) in 1991 produced a corpus of 651 whole and fragmentary cuneiform tablets. One tablet, along with seven fragments, derived from a courtyard (Room 10), while the rest came from a context associated with four broken jars in the adjoining Room 12 (van de Mieroop 1994, 305, see Pulhan 2000, for an extensive analysis of the archaeological context). The preliminary report on this assemblage, which remains otherwise unpublished, gives schematic information on 61 dated disbursements of malt and beer grain (contained in SZE Dossier 1, see below), along with copies and transcriptions of 27 administrative documents, predominantly beer disbursements (see SZE Dossier 2). The remaining 563 tablets and fragments remain unedited. The time range given by dated examples discussed in the preliminary report covers a very narrow set of years, namely REL 206-208 (1767-1765 BCE). One dated text from the courtyard is dated slighter later, i.e. REL 212 (van de Mieroop 1994, 306).

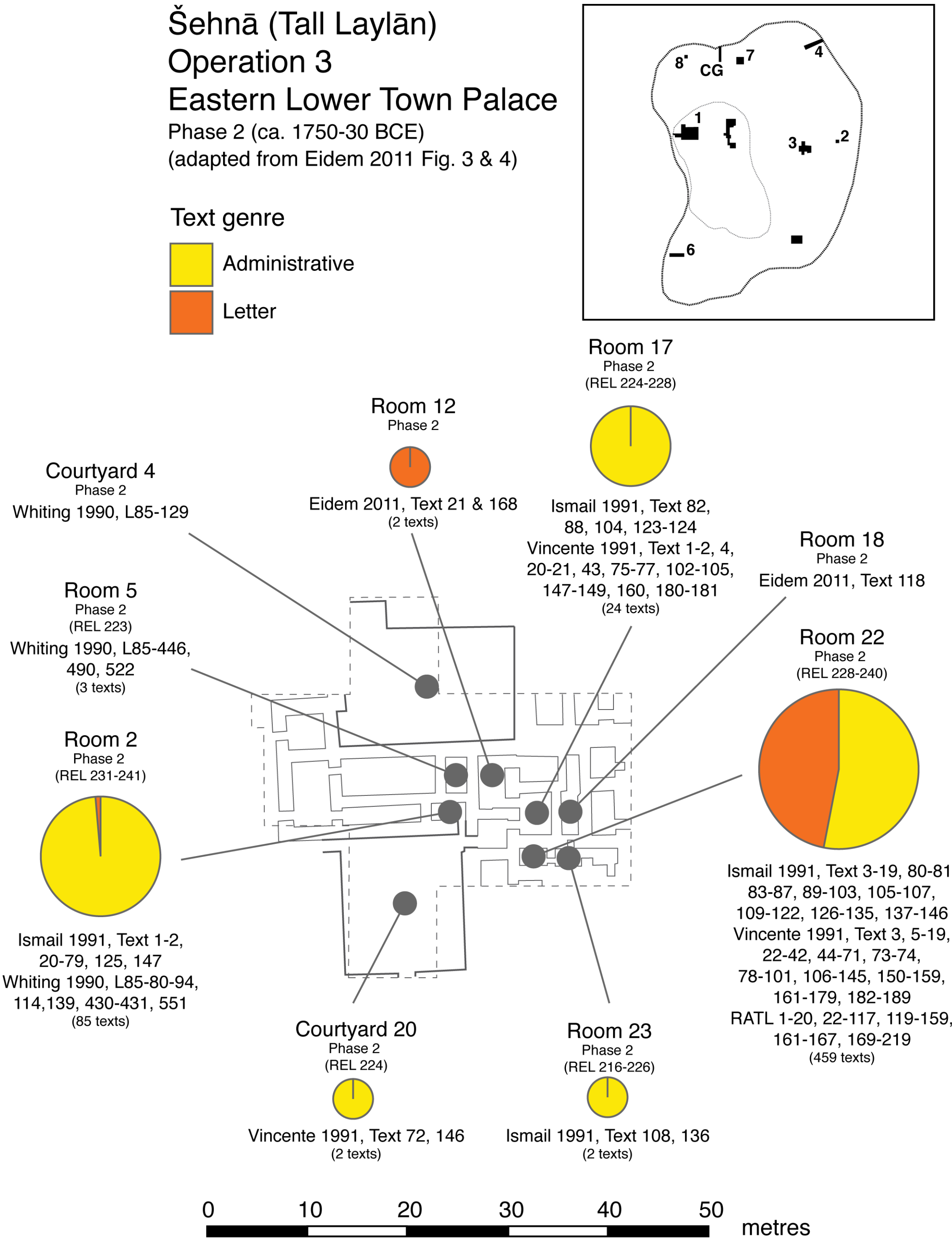


Figure 15.94: Distribution of cuneiform assemblages within the Eastern Lower Town Palace (Operation 3) at Šehnā.

15.4 Analytical groups

15.4.1 Dossier (Group) SZE 1: Grain and malt disbursement records

This dossier encompasses a total 61 disbursement records from the Qarni-Lim Palace (Operation 7) preliminarily edited by van de Mieroop (1994, 310-317). These record disbursements of grain for the brewing of beer received by Mutu-ramê and were apparently kept with the beer disbursement records in Room 12 (see below). The 61 texts catalogued here derive from a group totalling 80 tablets (van de Mieroop 1994, 310). The dossier accounts for a variety of resources received over a period of 21 months, from the month of Maqrānum (IX*) in the year of Aššur-taklāku (REL 206) to the month of Nabrūm (IV*) in the year of Ahu-waqar (REL 208). The dossier is discussed in relation to beer production in Chapter 7.

Major_ID	Detail Data Type	Day	Month	Year	External_ID	Preservation Assessment
SZE_337_0_0	L91-374	8	9	206	SZE_QLP_Room_12	Unknown
SZE_338_0_0	L91-348	12	10	206	SZE_QLP_Room_12	Unknown
SZE_339_0_0	L91-324	13	10	206	SZE_QLP_Room_12	Unknown
SZE_340_0_0	L91-203	2	11	206	SZE_QLP_Room_12	Unknown
SZE_341_0_0	L91-535	7	11	206	SZE_QLP_Room_12	Unknown
SZE_342_0_0	L91-235	10	11	206	SZE_QLP_Room_12	Unknown
SZE_343_0_0	L91-510	2	12	206	SZE_QLP_Room_12	Unknown
SZE_344_0_0	L91-339	7	12	206	SZE_QLP_Room_12	Unknown
SZE_345_0_0	L91-487	20	12	206	SZE_QLP_Room_12	Unknown
SZE_346_0_0	L91-482	25	12	206	SZE_QLP_Room_12	Unknown
SZE_347_0_0	L91-471	28	12	206	SZE_QLP_Room_12	Unknown
SZE_348_0_0	L91-414	2	1	207	SZE_QLP_Room_12	Unknown
SZE_349_0_0	L91-326	14	1	207	SZE_QLP_Room_12	Unknown
SZE_350_0_0	L91-400	30	1	207	SZE_QLP_Room_12	Unknown
SZE_351_0_0	L91-383		1	207	SZE_QLP_Room_12	Unknown
SZE_352_0_0	L91-357	31	2	207	SZE_QLP_Room_12	Unknown
SZE_353_0_0	L91-464	1	3	207	SZE_QLP_Room_12	Unknown
SZE_354_0_0	L91-246	4	3	207	SZE_QLP_Room_12	Unknown
SZE_355_0_0	L91-442	16	3	207	SZE_QLP_Room_12	Unknown
SZE_356_0_0	L91-521	29	3	207	SZE_QLP_Room_12	Unknown
SZE_357_0_0	L91-376	1	4	207	SZE_QLP_Room_12	Unknown
SZE_358_0_0	L91-475	10	4	207	SZE_QLP_Room_12	Unknown
SZE_359_0_0	L91-398	11	4	207	SZE_QLP_Room_12	Unknown
SZE_360_0_0	L91-222	18	4	207	SZE_QLP_Room_12	Unknown
SZE_361_0_0	L91-221	5	5	207	SZE_QLP_Room_12	Unknown
SZE_362_0_0	L91-514	10	5	207	SZE_QLP_Room_12	Unknown
SZE_363_0_0	L91-254	15	5	207	SZE_QLP_Room_12	Unknown
SZE_364_0_0	L91-413	25	5	207	SZE_QLP_Room_12	Unknown

SZE_365_0_0	L91-649	28	5	207	SZE_QLP_Room_12	Unknown
SZE_366_0_0	L91-225		5	207	SZE_QLP_Room_12	Unknown
SZE_367_0_0	L91-282	7	6	207	SZE_QLP_Room_12	Unknown
SZE_368_0_0	L91-230	9	6	207	SZE_QLP_Room_12	Unknown
SZE_369_0_0	L91-386	10	6	207	SZE_QLP_Room_12	Unknown
SZE_370_0_0	L91-280	15	6	207	SZE_QLP_Room_12	Unknown
SZE_371_0_0	L91-253	22	6	207	SZE_QLP_Room_12	Unknown
SZE_372_0_0	L91-367	13	13	207	SZE_QLP_Room_12	Unknown
SZE_373_0_0	L91-430	18	13	207	SZE_QLP_Room_12	Unknown
SZE_374_0_0	L91-522	25	13	207	SZE_QLP_Room_12	Unknown
SZE_375_0_0	L91-265	10	7	207	SZE_QLP_Room_12	Unknown
SZE_376_0_0	L91-388	15	7	207	SZE_QLP_Room_12	Unknown
SZE_377_0_0	L91-355	17	7	207	SZE_QLP_Room_12	Unknown
SZE_378_0_0	L91-625	3	8	207	SZE_QLP_Room_12	Unknown
SZE_379_0_0	L91-631	4	8	207	SZE_QLP_Room_12	Unknown
SZE_380_0_0	L91-390	5	8	207	SZE_QLP_Room_12	Unknown
SZE_381_0_0	L91-628	6	8	207	SZE_QLP_Room_12	Unknown
SZE_382_0_0	L91-653	20	8	207	SZE_QLP_Room_12	Unknown
SZE_383_0_0	L91-754		8	207	SZE_QLP_Room_12	Unknown
SZE_384_0_0	L91-778	1	9	207	SZE_QLP_Room_12	Unknown
SZE_385_0_0	L91-823	5	10	207	SZE_QLP_Room_12	Unknown
SZE_386_0_0	L91-677	7	10	207	SZE_QLP_Room_12	Unknown
SZE_387_0_0	L91-748	23	10	207	SZE_QLP_Room_12	Unknown
SZE_388_0_0	L91-826	28	10	207	SZE_QLP_Room_12	Unknown
SZE_389_0_0	L91-819	3	11	207	SZE_QLP_Room_12	Unknown
SZE_390_0_0	L91-808	10	11	207	SZE_QLP_Room_12	Unknown
SZE_391_0_0	L91-692	27	11	207	SZE_QLP_Room_12	Unknown
SZE_392_0_0	L91-648	5	12	207	SZE_QLP_Room_12	Unknown
SZE_393_0_0	L91-736	14	12	207	SZE_QLP_Room_12	Unknown
SZE_394_0_0	L91-632	22	12	207	SZE_QLP_Room_12	Unknown
SZE_395_0_0	L91-693	13	2	208	SZE_QLP_Room_12	Unknown
SZE_396_0_0	L91-811	0	3	208	SZE_QLP_Room_12	Unknown
SZE_397_0_0	L91-820	0	4	208	SZE_QLP_Room_12	Unknown

Table 15.87: Dossier (Group) SZE 1 reference data

15.4.2 Dossier (Group) SZE 2: Beer disbursement records

This dossier includes a total 25 beer disbursement records presented by van de Mieroop (1994, 317-338), out of a total 447 tablets relating to beer disbursements found in Room 12 of the Qarni-Lim Palace (Operation 7). The dossier is discussed in relation to beer consumption in Chapter 7.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_398_0_0	L91-399	4	10	206	SZE_QLP_Room_12	Complete
SZE_399_0_0	L91-306	9	11	206	SZE_QLP_Room_12	Fairly complete
SZE_400_0_0	L91-504	11	12	206	SZE_QLP_Room_12	Fairly complete
SZE_401_0_0	L91-247	11	1	207	SZE_QLP_Room_12	Complete

SZE_402_0_0	L91-220	7	2	207	SZE_QLP_Room_12	Complete
SZE_403_0_0	L91-391	23	2	207	SZE_QLP_Room_12	Fairly complete
SZE_404_0_0	L91-503	20	3	207	SZE_QLP_Room_12	Fairly complete
SZE_405_0_0	L91-271	15	4	207	SZE_QLP_Room_12	Fairly complete
SZE_406_0_0	L91-466	22	5	207	SZE_QLP_Room_12	Fairly complete
SZE_407_0_0	L91-362	5	6	207	SZE_QLP_Room_12	Fairly complete
SZE_408_0_0	L91-508	27	13	207	SZE_QLP_Room_12	Fairly complete
SZE_409_0_0	L91-264	12	7	207	SZE_QLP_Room_12	Complete
SZE_410_0_0	L91-642	4	8	207	SZE_QLP_Room_12	Fairly complete
SZE_411_0_0	L91-738	8	9	207	SZE_QLP_Room_12	Fairly complete
SZE_412_0_0	L91-696	27	9	207	SZE_QLP_Room_12	Damaged
SZE_413_0_0	L91-746	21	10	207	SZE_QLP_Room_12	Complete
SZE_414_0_0	L91-822	18	10	207	SZE_QLP_Room_12	Fairly complete
SZE_415_0_0	L91-689	2	11	207	SZE_QLP_Room_12	Fairly complete
SZE_416_0_0	L91-745	16	12	207	SZE_QLP_Room_12	Fairly complete
SZE_417_0_0	L91-694	8	1	208	SZE_QLP_Room_12	Fairly complete
SZE_418_0_0	L91-731	16	1	208	SZE_QLP_Room_12	Fairly complete
SZE_419_0_0	L91-750	13	2	208	SZE_QLP_Room_12	Complete
SZE_420_0_0	L91-799	26	3	208	SZE_QLP_Room_12	Complete
SZE_421_0_0	L91-828	12	4	208	SZE_QLP_Room_12	Fairly complete
SZE_422_0_0	L91-455A				SZE_QLP_Room_12	Fairly complete

Table 15.88: Dossier (Group) SZE 2 reference data

15.4.3 Dossier (Group) SZE 3: Receipts and disbursements of oil

This dossier totals 18 texts from the Lower Eastern Town Palace Rooms 17, 20, and 22, one receipt and 17 disbursement records. The latter group comprises the subordinated Series (Group) SZE 1. The dossier is discussed in relation to oil production and consumption in Chapter 7.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_293_0_0	Vincente1991_146	18	10	224	SZE_LTP_Room_20	Damaged
SZE_294_0_0	Vincente1991_147	17	11	224	SZE_LTP_Room_17	Damaged
SZE_295_0_0	Vincente1991_148				SZE_LTP_Room_17	Damaged
SZE_296_0_0	Vincente1991_149	1	11	224	SZE_LTP_Room_17	Fairly complete
SZE_297_0_0	Vincente1991_150	16	11	224	SZE_LTP_Room_22	Complete
SZE_298_0_0	Vincente1991_151	10	13	224	SZE_LTP_Room_22	Damaged
SZE_299_0_0	Vincente1991_152		11	224	SZE_LTP_Room_22	Fairly complete
SZE_300_0_0	Vincente1991_153	5	7	224	SZE_LTP_Room_22	Fairly complete
SZE_301_0_0	Vincente1991_154	23	11	224	SZE_LTP_Room_22	Complete
SZE_302_0_0	Vincente1991_155	10	6	224	SZE_LTP_Room_22	Damaged
SZE_303_0_0	Vincente1991_156	20	9	224	SZE_LTP_Room_22	Complete
SZE_304_0_0	Vincente1991_157	15	11	224	SZE_LTP_Room_22	Fairly complete
SZE_305_0_0	Vincente1991_158			224	SZE_LTP_Room_22	Damaged
SZE_306_0_0	Vincente1991_159	19	11	224	SZE_LTP_Room_22	Fairly complete

SZE_307_0_0	Vincente1991_160	1	11	224	SZE_LTP_Room_17	Complete
SZE_308_0_0	Vincente1991_161	24	11	224	SZE_LTP_Room_22	Complete
SZE_126_0_0	Ismail1991_126	18	4	226	SZE_LTP_Room_22	Fairly complete
SZE_128_0_0	Ismail1991_128	3	4	225	SZE_LTP_Room_22	Complete

Table 15.89: Dossier (Group) SZE 3 reference data

15.4.3.1 Series (Group) SZE 1: Oil disbursements

This series comprises 17 oil disbursement records (Ismail 1991 Texts 126 and 128, along with Vincente 1991 Texts 146-152 and 154-161), thus excluding the receipt contained in SZE Dossier 3. The series is discussed in relation to oil consumption in Chapter 7.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_293_0_0	Vincente1991_146	18	10	224	SZE_LTP_Room_20	Damaged
SZE_294_0_0	Vincente1991_147	17	11	224	SZE_LTP_Room_17	Damaged
SZE_295_0_0	Vincente1991_148				SZE_LTP_Room_17	Damaged
SZE_296_0_0	Vincente1991_149	1	11	224	SZE_LTP_Room_17	Fairly complete
SZE_297_0_0	Vincente1991_150	16	11	224	SZE_LTP_Room_22	Complete
SZE_298_0_0	Vincente1991_151	10	13	224	SZE_LTP_Room_22	Damaged
SZE_299_0_0	Vincente1991_152		11	224	SZE_LTP_Room_22	Fairly complete
SZE_301_0_0	Vincente1991_154	23	11	224	SZE_LTP_Room_22	Complete
SZE_302_0_0	Vincente1991_155	10	6	224	SZE_LTP_Room_22	Damaged
SZE_303_0_0	Vincente1991_156	20	9	224	SZE_LTP_Room_22	Complete
SZE_304_0_0	Vincente1991_157	15	11	224	SZE_LTP_Room_22	Fairly complete
SZE_305_0_0	Vincente1991_158			224	SZE_LTP_Room_22	Damaged
SZE_306_0_0	Vincente1991_159	19	11	224	SZE_LTP_Room_22	Fairly complete
SZE_307_0_0	Vincente1991_160	1	11	224	SZE_LTP_Room_17	Complete
SZE_308_0_0	Vincente1991_161	24	11	224	SZE_LTP_Room_22	Complete
SZE_126_0_0	Ismail1991_126	18	4	226	SZE_LTP_Room_22	Fairly complete
SZE_128_0_0	Ismail1991_128	3	4	225	SZE_LTP_Room_22	Complete

Table 15.90: Series (Group) SZE 1 reference data

15.4.4 Dossier (Group) SZE 4: Wine accounts

The dossier includes a total 92 records relating to the receipt and disbursement of wine within the Eastern Lower Town Palace at Šehnā (see Ismail 1991, 22-84, Vincente 1991, 288-312). Two series are extrapolated from this group and discussed in reference to wine production and consumption in Chapter 6.10, namely SZE Series 2, on wine disbursements, and SZE Series 3, on wine receipts.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_1_0_0	Ismail1991_001		3	206	SZE_LTP_Room_2	Damaged
SZE_2_0_0	Ismail1991_002	6	7	206	SZE_LTP_Room_2	Complete
SZE_3_0_0	Ismail1991_003	26	3	226	SZE_LTP_Room_22	Complete
SZE_4_0_0	Ismail1991_004	8	7	226	SZE_LTP_Room_22	Damaged

SZE_5_0_0	Ismail1991_005	6	2	225	SZE_LTP_Room_22	Fairly complete
SZE_6_0_0	Ismail1991_006	13	2	225	SZE_LTP_Room_22	Complete
SZE_7_0_0	Ismail1991_007	15	2	225	SZE_LTP_Room_22	Fairly complete
SZE_8_0_0	Ismail1991_008	27	2	225	SZE_LTP_Room_22	Fairly complete
SZE_9_0_0	Ismail1991_009	28	2	225	SZE_LTP_Room_22	Fairly complete
SZE_10_0_0	Ismail1991_010	28	2	225	SZE_LTP_Room_22	Complete
SZE_11_0_0	Ismail1991_011	30	2	225	SZE_LTP_Room_22	Complete
SZE_12_0_0	Ismail1991_012	1	3	225	SZE_LTP_Room_22	Fairly complete
SZE_13_0_0	Ismail1991_013	7	4	225	SZE_LTP_Room_22	Complete
SZE_14_0_0	Ismail1991_014	30	4	225	SZE_LTP_Room_22	Damaged
SZE_15_0_0	Ismail1991_015	11	5	225	SZE_LTP_Room_22	Fairly complete
SZE_16_0_0	Ismail1991_016	20	5	225	SZE_LTP_Room_22	Fairly complete
SZE_17_0_0	Ismail1991_017	30	5	225	SZE_LTP_Room_22	Damaged
SZE_18_0_0	Ismail1991_018	5	6	225	SZE_LTP_Room_22	Damaged
SZE_19_0_0	Ismail1991_019	4	6	225	SZE_LTP_Room_22	Damaged
SZE_20_0_0	Ismail1991_020	6	5	240	SZE_LTP_Room_2	Damaged
SZE_21_0_0	Ismail1991_021	2	7	240	SZE_LTP_Room_2	Damaged
SZE_22_0_0	Ismail1991_022	4	7	240	SZE_LTP_Room_2	Complete
SZE_23_0_0	Ismail1991_023	8	7	240	SZE_LTP_Room_2	Damaged
SZE_24_0_0	Ismail1991_024	12	7	240	SZE_LTP_Room_2	Damaged
SZE_25_0_0	Ismail1991_025	15	7	240	SZE_LTP_Room_2	Damaged
SZE_26_0_0	Ismail1991_026	20	7	240	SZE_LTP_Room_2	Complete
SZE_27_0_0	Ismail1991_027	23	7	240	SZE_LTP_Room_2	Complete
SZE_28_0_0	Ismail1991_028	27	7	240	SZE_LTP_Room_2	Complete
SZE_29_0_0	Ismail1991_029	2	1	231	SZE_LTP_Room_2	Complete
SZE_30_0_0	Ismail1991_030	2	3	231	SZE_LTP_Room_2	Fairly complete
SZE_31_0_0	Ismail1991_031	26	3	231	SZE_LTP_Room_2	Damaged
SZE_32_0_0	Ismail1991_032	4	5	231	SZE_LTP_Room_2	Damaged
SZE_33_0_0	Ismail1991_033	1	7	231	SZE_LTP_Room_2	Fairly complete
SZE_34_0_0	Ismail1991_034	3	7	231	SZE_LTP_Room_2	Fairly complete
SZE_35_0_0	Ismail1991_035	4	7	231	SZE_LTP_Room_2	Complete
SZE_36_0_0	Ismail1991_036	10	7	231	SZE_LTP_Room_2	Fairly complete
SZE_37_0_0	Ismail1991_037	11	7	231	SZE_LTP_Room_2	Fairly complete
SZE_38_0_0	Ismail1991_038	12	7	231	SZE_LTP_Room_2	Complete
SZE_39_0_0	Ismail1991_039	18	7	231	SZE_LTP_Room_2	Complete
SZE_40_0_0	Ismail1991_040	26	7	231	SZE_LTP_Room_2	Complete
SZE_41_0_0	Ismail1991_041	28	7	231	SZE_LTP_Room_2	Damaged
SZE_42_0_0	Ismail1991_042		7	231	SZE_LTP_Room_2	Fairly complete
SZE_43_0_0	Ismail1991_043		7	231	SZE_LTP_Room_2	Fairly complete
SZE_44_0_0	Ismail1991_044	4	8	231	SZE_LTP_Room_2	Damaged
SZE_45_0_0	Ismail1991_045	8	8	231	SZE_LTP_Room_2	Fairly complete
SZE_46_0_0	Ismail1991_046	9	8	231	SZE_LTP_Room_2	Damaged
SZE_47_0_0	Ismail1991_047	10	8	231	SZE_LTP_Room_2	Complete
SZE_48_0_0	Ismail1991_048	15	8	231	SZE_LTP_Room_2	Fairly complete
SZE_49_0_0	Ismail1991_049	21	8	231	SZE_LTP_Room_2	Complete
SZE_50_0_0	Ismail1991_050	22	8	231	SZE_LTP_Room_2	Fairly complete
SZE_51_0_0	Ismail1991_051		8	231	SZE_LTP_Room_2	Damaged
SZE_52_0_0	Ismail1991_052	20	9	231	SZE_LTP_Room_2	Fairly complete
SZE_53_0_0	Ismail1991_053	21	9	231	SZE_LTP_Room_2	Complete

SZE_54_0_0	Ismail1991_054	24	9	231	SZE_LTP_Room_2	Damaged
SZE_55_0_0	Ismail1991_055	1	10	231	SZE_LTP_Room_2	Damaged
SZE_56_0_0	Ismail1991_056	12	10	231	SZE_LTP_Room_2	Complete
SZE_57_0_0	Ismail1991_057	15	10	231	SZE_LTP_Room_2	Complete
SZE_58_0_0	Ismail1991_058	20	10	231	SZE_LTP_Room_2	Complete
SZE_59_0_0	Ismail1991_059	26	10	231	SZE_LTP_Room_2	Complete
SZE_60_0_0	Ismail1991_060	30	10	231	SZE_LTP_Room_2	Damaged
SZE_61_0_0	Ismail1991_061		10	231	SZE_LTP_Room_2	Damaged
SZE_62_0_0	Ismail1991_062	6	11	231	SZE_LTP_Room_2	Damaged
SZE_63_0_0	Ismail1991_063	11	11	231	SZE_LTP_Room_2	Damaged
SZE_64_0_0	Ismail1991_064	15	11	231	SZE_LTP_Room_2	Fairly complete
SZE_65_0_0	Ismail1991_065	15	11	231	SZE_LTP_Room_2	Fairly complete
SZE_66_0_0	Ismail1991_066	22	11	231	SZE_LTP_Room_2	Fairly complete
SZE_67_0_0	Ismail1991_067	22	11	231	SZE_LTP_Room_2	Fairly complete
SZE_68_0_0	Ismail1991_068	26	11	231	SZE_LTP_Room_2	Damaged
SZE_69_0_0	Ismail1991_069	17	12	231	SZE_LTP_Room_2	Fairly complete
SZE_70_0_0	Ismail1991_070	21	12	231	SZE_LTP_Room_2	Damaged
SZE_71_0_0	Ismail1991_071	23	12	231	SZE_LTP_Room_2	Fairly complete
SZE_72_0_0	Ismail1991_072		12	231	SZE_LTP_Room_2	Damaged
SZE_73_0_0	Ismail1991_073	11		231	SZE_LTP_Room_2	Damaged
SZE_74_0_0	Ismail1991_074			231	SZE_LTP_Room_2	Damaged
SZE_75_0_0	Ismail1991_075			231	SZE_LTP_Room_2	Damaged
SZE_76_0_0	Ismail1991_076		12	231	SZE_LTP_Room_2	Damaged
SZE_77_0_0	Ismail1991_077	2	1	232	SZE_LTP_Room_2	Fairly complete
SZE_78_0_0	Ismail1991_078		7		SZE_LTP_Room_2	Damaged
SZE_79_0_0	Ismail1991_079		10		SZE_LTP_Room_2	Damaged
SZE_254_0_0	Vincente1991_107	5	7	224	SZE_LTP_Room_22	Complete
SZE_255_0_0	Vincente1991_108	15	6	224	SZE_LTP_Room_22	Fairly complete
SZE_256_0_0	Vincente1991_109	17	5	224	SZE_LTP_Room_22	Fairly complete
SZE_257_0_0	Vincente1991_110	21	7	224	SZE_LTP_Room_22	Fairly complete
SZE_258_0_0	Vincente1991_111	25	8	224	SZE_LTP_Room_22	Complete
SZE_259_0_0	Vincente1991_112	19	5	224	SZE_LTP_Room_22	Fairly complete
SZE_260_0_0	Vincente1991_113	26	13	224	SZE_LTP_Room_22	Complete
SZE_261_0_0	Vincente1991_114	26	5	224	SZE_LTP_Room_22	Complete
SZE_262_0_0	Vincente1991_115	6	5	224	SZE_LTP_Room_22	Fairly complete
SZE_263_0_0	Vincente1991_116	14	6	224	SZE_LTP_Room_22	Damaged
SZE_264_0_0	Vincente1991_117	7	13	224	SZE_LTP_Room_22	Fairly complete
SZE_265_0_0	Vincente1991_118	19	13	224	SZE_LTP_Room_22	Damaged
SZE_266_0_0	Vincente1991_119	11	6	224	SZE_LTP_Room_22	Damaged

Table 15.91: Dossier (Group) SZE 4 reference data

15.4.4.1 Series (Group) SZE 2: Wine disbursements

The series includes 65 disbursement records dealing with wine from Room 2 and 22 of the Eastern Lower Town Palace. The series is discussed in 6.10.4.

Appendix 1: Site biographies

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_1_0_0	Ismail1991_001		3	206	SZE_LTP_Room_2	Damaged
SZE_2_0_0	Ismail1991_002	6	7	206	SZE_LTP_Room_2	Complete
SZE_4_0_0	Ismail1991_004	8	7	226	SZE_LTP_Room_22	Damaged
SZE_14_0_0	Ismail1991_014	30	4	225	SZE_LTP_Room_22	Damaged
SZE_16_0_0	Ismail1991_016	20	5	225	SZE_LTP_Room_22	Fairly complete
SZE_17_0_0	Ismail1991_017	30	5	225	SZE_LTP_Room_22	Damaged
SZE_20_0_0	Ismail1991_020	6	5	240	SZE_LTP_Room_2	Damaged
SZE_21_0_0	Ismail1991_021	2	7	240	SZE_LTP_Room_2	Damaged
SZE_22_0_0	Ismail1991_022	4	7	240	SZE_LTP_Room_2	Complete
SZE_23_0_0	Ismail1991_023	8	7	240	SZE_LTP_Room_2	Damaged
SZE_24_0_0	Ismail1991_024	12	7	240	SZE_LTP_Room_2	Damaged
SZE_25_0_0	Ismail1991_025	15	7	240	SZE_LTP_Room_2	Damaged
SZE_26_0_0	Ismail1991_026	20	7	240	SZE_LTP_Room_2	Complete
SZE_27_0_0	Ismail1991_027	23	7	240	SZE_LTP_Room_2	Complete
SZE_28_0_0	Ismail1991_028	27	7	240	SZE_LTP_Room_2	Complete
SZE_29_0_0	Ismail1991_029	2	1	231	SZE_LTP_Room_2	Complete
SZE_30_0_0	Ismail1991_030	2	3	231	SZE_LTP_Room_2	Fairly complete
SZE_31_0_0	Ismail1991_031	26	3	231	SZE_LTP_Room_2	Damaged
SZE_32_0_0	Ismail1991_032	4	5	231	SZE_LTP_Room_2	Damaged
SZE_33_0_0	Ismail1991_033	1	7	231	SZE_LTP_Room_2	Fairly complete
SZE_34_0_0	Ismail1991_034	3	7	231	SZE_LTP_Room_2	Fairly complete
SZE_35_0_0	Ismail1991_035	4	7	231	SZE_LTP_Room_2	Complete
SZE_36_0_0	Ismail1991_036	10	7	231	SZE_LTP_Room_2	Fairly complete
SZE_37_0_0	Ismail1991_037	11	7	231	SZE_LTP_Room_2	Fairly complete
SZE_38_0_0	Ismail1991_038	12	7	231	SZE_LTP_Room_2	Complete
SZE_39_0_0	Ismail1991_039	18	7	231	SZE_LTP_Room_2	Complete
SZE_40_0_0	Ismail1991_040	26	7	231	SZE_LTP_Room_2	Complete
SZE_41_0_0	Ismail1991_041	28	7	231	SZE_LTP_Room_2	Damaged
SZE_42_0_0	Ismail1991_042		7	231	SZE_LTP_Room_2	Fairly complete
SZE_43_0_0	Ismail1991_043		7	231	SZE_LTP_Room_2	Fairly complete
SZE_44_0_0	Ismail1991_044	4	8	231	SZE_LTP_Room_2	Damaged
SZE_45_0_0	Ismail1991_045	8	8	231	SZE_LTP_Room_2	Fairly complete
SZE_46_0_0	Ismail1991_046	9	8	231	SZE_LTP_Room_2	Damaged
SZE_47_0_0	Ismail1991_047	10	8	231	SZE_LTP_Room_2	Complete
SZE_48_0_0	Ismail1991_048	15	8	231	SZE_LTP_Room_2	Fairly complete
SZE_49_0_0	Ismail1991_049	21	8	231	SZE_LTP_Room_2	Complete
SZE_50_0_0	Ismail1991_050	22	8	231	SZE_LTP_Room_2	Fairly complete
SZE_51_0_0	Ismail1991_051		8	231	SZE_LTP_Room_2	Damaged
SZE_52_0_0	Ismail1991_052	20	9	231	SZE_LTP_Room_2	Fairly complete
SZE_53_0_0	Ismail1991_053	21	9	231	SZE_LTP_Room_2	Complete
SZE_54_0_0	Ismail1991_054	24	9	231	SZE_LTP_Room_2	Damaged
SZE_55_0_0	Ismail1991_055	1	10	231	SZE_LTP_Room_2	Damaged
SZE_56_0_0	Ismail1991_056	12	10	231	SZE_LTP_Room_2	Complete
SZE_57_0_0	Ismail1991_057	15	10	231	SZE_LTP_Room_2	Complete
SZE_59_0_0	Ismail1991_059	26	10	231	SZE_LTP_Room_2	Complete
SZE_60_0_0	Ismail1991_060	30	10	231	SZE_LTP_Room_2	Damaged
SZE_61_0_0	Ismail1991_061		10	231	SZE_LTP_Room_2	Damaged

SZE_62_0_0	Ismail1991_062	6	11	231	SZE_LTP_Room_2	Damaged
SZE_63_0_0	Ismail1991_063	11	11	231	SZE_LTP_Room_2	Damaged
SZE_64_0_0	Ismail1991_064	15	11	231	SZE_LTP_Room_2	Fairly complete
SZE_65_0_0	Ismail1991_065	15	11	231	SZE_LTP_Room_2	Fairly complete
SZE_66_0_0	Ismail1991_066	22	11	231	SZE_LTP_Room_2	Fairly complete
SZE_67_0_0	Ismail1991_067	22	11	231	SZE_LTP_Room_2	Fairly complete
SZE_68_0_0	Ismail1991_068	26	11	231	SZE_LTP_Room_2	Damaged
SZE_69_0_0	Ismail1991_069	17	12	231	SZE_LTP_Room_2	Fairly complete
SZE_70_0_0	Ismail1991_070	21	12	231	SZE_LTP_Room_2	Damaged
SZE_71_0_0	Ismail1991_071	23	12	231	SZE_LTP_Room_2	Fairly complete
SZE_72_0_0	Ismail1991_072		12	231	SZE_LTP_Room_2	Damaged
SZE_73_0_0	Ismail1991_073	11		231	SZE_LTP_Room_2	Damaged
SZE_74_0_0	Ismail1991_074			231	SZE_LTP_Room_2	Damaged
SZE_75_0_0	Ismail1991_075			231	SZE_LTP_Room_2	Damaged
SZE_76_0_0	Ismail1991_076		12	231	SZE_LTP_Room_2	Damaged
SZE_77_0_0	Ismail1991_077	2	1	232	SZE_LTP_Room_2	Fairly complete
SZE_78_0_0	Ismail1991_078		7		SZE_LTP_Room_2	Damaged
SZE_79_0_0	Ismail1991_079		10		SZE_LTP_Room_2	Damaged

Table 15.92: Series (Group) SZE 2 reference data

15.4.4.2 Series (Group) SZE 3: Wine receipts

The second series in SZE Dossier 4 includes 26 records of receipt, all from Room 22 of the Eastern Lower Town Palace. The series is discussed in relation to the circulation and consumption of wine in 6.10.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_254_0_0	Vincente1991_107	5	7	224	SZE_LTP_Room_22	Complete
SZE_255_0_0	Vincente1991_108	15	6	224	SZE_LTP_Room_22	Fairly complete
SZE_256_0_0	Vincente1991_109	17	5	224	SZE_LTP_Room_22	Fairly complete
SZE_257_0_0	Vincente1991_110	21	7	224	SZE_LTP_Room_22	Fairly complete
SZE_258_0_0	Vincente1991_111	25	8	224	SZE_LTP_Room_22	Complete
SZE_259_0_0	Vincente1991_112	19	5	224	SZE_LTP_Room_22	Fairly complete
SZE_260_0_0	Vincente1991_113	26	13	224	SZE_LTP_Room_22	Complete
SZE_261_0_0	Vincente1991_114	26	5	224	SZE_LTP_Room_22	Complete
SZE_262_0_0	Vincente1991_115	6	5	224	SZE_LTP_Room_22	Fairly complete
SZE_263_0_0	Vincente1991_116	14	6	224	SZE_LTP_Room_22	Damaged
SZE_264_0_0	Vincente1991_117	7	13	224	SZE_LTP_Room_22	Fairly complete
SZE_265_0_0	Vincente1991_118	19	13	224	SZE_LTP_Room_22	Damaged
SZE_266_0_0	Vincente1991_119	11	6	224	SZE_LTP_Room_22	Damaged
SZE_3_0_0	Ismail1991_003	26	3	226	SZE_LTP_Room_22	Complete
SZE_5_0_0	Ismail1991_005	6	2	225	SZE_LTP_Room_22	Fairly complete
SZE_6_0_0	Ismail1991_006	13	2	225	SZE_LTP_Room_22	Complete
SZE_7_0_0	Ismail1991_007	15	2	225	SZE_LTP_Room_22	Fairly complete
SZE_8_0_0	Ismail1991_008	27	2	225	SZE_LTP_Room_22	Fairly complete
SZE_9_0_0	Ismail1991_009	28	2	225	SZE_LTP_Room_22	Fairly complete
SZE_10_0_0	Ismail1991_010	28	2	225	SZE_LTP_Room_22	Complete
SZE_11_0_0	Ismail1991_011	30	2	225	SZE_LTP_Room_22	Complete

SZE_12_0_0	Ismail1991_012	1	3	225	SZE_LTP_Room_22	Fairly complete
SZE_13_0_0	Ismail1991_013	7	4	225	SZE_LTP_Room_22	Complete
SZE_15_0_0	Ismail1991_015	11	5	225	SZE_LTP_Room_22	Fairly complete
SZE_18_0_0	Ismail1991_018	5	6	225	SZE_LTP_Room_22	Damaged
SZE_19_0_0	Ismail1991_019	4	6	225	SZE_LTP_Room_22	Damaged

Table 15.93: Series (Group) SZE 3 reference data

15.4.5 Series (Group) SZE 4: Syrup disbursements

This series includes a total ten disbursement records on small amounts of syrup or honey, all from Room 22 of the Eastern Lower Town Palace (Vincente 1991, 313-331). The series is discussed in relation to sweeteners in 6.9.1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZE_267_0_0	Vincente1991_120	10	9	224	SZE_LTP_Room_22	Damaged
SZE_268_0_0	Vincente1991_121	4	13	224	SZE_LTP_Room_22	Fairly complete
SZE_269_0_0	Vincente1991_122	17	7	224	SZE_LTP_Room_22	Complete
SZE_270_0_0	Vincente1991_123	24	9	224	SZE_LTP_Room_22	Complete
SZE_271_0_0	Vincente1991_124	19	7	224	SZE_LTP_Room_22	Complete
SZE_272_0_0	Vincente1991_125	22	13	224	SZE_LTP_Room_22	Damaged
SZE_273_0_0	Vincente1991_126	21	7	224	SZE_LTP_Room_22	Complete
SZE_274_0_0	Vincente1991_127	15	6	224	SZE_LTP_Room_22	Damaged
SZE_275_0_0	Vincente1991_128	11	7	224	SZE_LTP_Room_22	Fairly complete
SZE_276_0_0	Vincente1991_129	16	6	224	SZE_LTP_Room_22	Damaged

Table 15.94: Series (Group) SZE 4 reference data

16 Qaṭṭarā (Tall al-Rimah)

Qaṭṭarā (modern Tall al-Rimah) lies 13 kilometres due south of Tal‘afār, below the Sinjār range west of Mosul. Including the Middle Bronze Age ramparts, the site extends over some 28 ha (Figure 16.95), with a considerably smaller main mound (ca. 5 ha) constituting the remains of earlier occupational phases rising some 25 metres above the plains (for overviews, see Oates 1982, Bryce 2009, 595-596). Tall al-Rimah sits on a tributary of the Wādī Tharthar, an intermittent drainage system feeding on precipitation runoff and groundwater springs from the anticline slopes on either side of Tal’afār. The majority of these streams converge some 35 kilometres below Rimah, at Tall ’Abṭah, and eventually discharge into the Tharthar Depression 200 kilometres further south. Though utilised as an excess water reservoir since 1956 CE, the endorheic lake formed by precipitation runoff from the Tharthar drainage system may have been only periodically present in the past, and is, for example, not mentioned by late Medieval geographers (Jassim and Goff 2006, 268, Sissakian 2011, 52).

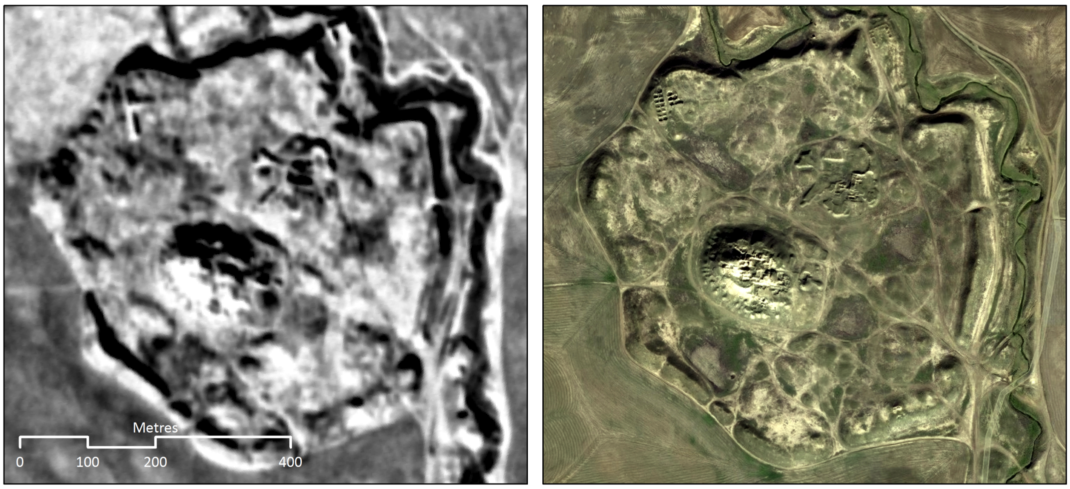


Figure 16.95: Qaṭṭarā (Tall al-Rimah) from Corona 1108 (December 1969) and DigitalGlobe & Bing Maps (c. 2010)

Though subject to substantial variability, settlements within a 20-30 kilometres distance from the mountains see annual precipitation levels of ca. 300 mm, while an average of 200 mm per year can be found as far into the steppe as Haḍra a little less than 100 kilometres south. During winter and early spring, rain and associated runoff from the anticlines turns the dry steppe into important pasture grounds for herds of livestock, especially sheep and goat (Altaweel 2008, 10). Within the arc flanked by the anticlinal formations of the Sinjār range environmental constraints then change dramatically over a very short distance, a situation also accentuated socially by the close intertwining of sedentary and semi-sedentary subsistence regimes observable in more recent times (see Oates 1968b, 14-18). Close to the mountains, the plain is dotted with settlement mounds, pre-dominantly concentrating along riverbeds. As one moves further south into the plain, site density diminishes and locations along watercourses become more pronounced.

In infrastructural terms, the ’Afār Plain occupies a most interesting transitory zone between upland and lowland Iraq. Several passes through the anticline range connect the area with the dry-farming plains of the Khabūr Basin and the Upper Tigris region, and, eastwards, with Mosul. Old Assyrian traders skirting the southern flanks of the anticlines passed through the ’Afār Plain en route between Aššur and Anatolia, a track followed also by much later commercial ventures that brought Haḍra to fame. This traffic, among other things, is vividly attested in the 18th century BCE textual documentation from Tall al-Rimah.

The ancient name of Tall al-Rimah has been debated, as two toponyms, Karanā and Qaṭṭarā occur regularly in the Middle Bronze Age texts from the site. For the Neo-Assyrian period, the name of the site is affirmatively Zamahu (Page 1968, 87). Saggs offered initial arguments for an identification of the site with Qaṭṭarā based on the regular appearance of this toponym in the Middle Assyrian textual corpus found at the site (Saggs 1968, 156), yet general consensus opted for Karanā (e.g. Oates 1982, 89, Dalley 1984, 22-23, reiterated, though less forcefully, in Postgate *et al.* 1997, 18-20). The position adhered to here is based on the re-assessment made by Charpin and Durand (1987) and, with equally important observations, by Nashef (1988, also Eidem 1989, 75-78).

The main mound shows signs of occupation dating back to at least the beginning of the Early Bronze Age, with evidence of Early Dynastic and Old Akkadian seal imprints (Parker 1975) and late 3rd millennium BCE stratigraphy (Postgate *et al.* 1997, 27-29). Soundings on the south side of the mound retrieved samples of Early Khabur Ware, indicating settlement also in the 20th and 19th centuries BCE (Postgate *et al.* 1997, 52-53, also Koliński 2014a, 31). The 18th century BCE settlement is characterised by monumental structures, i.e. a large temple complex on the high mound (Area A) and an equally grandiose palatial structure in the lower town (Area C). Assemblages of Old Babylonian texts derive from several contexts in these two areas. The absence of any material pre-dating 1800 BCE from the lower part of the mound suggests that the ramparts are of a Middle Bronze Age II date, though this has not been archaeologically confirmed (Postgate *et al.* 1997, 43).

Qaṭṭarā remained occupied through the late Middle Bronze and Late Bronze Age, with extensive Mitanni and Middle Assyrian settlement remains overlying the earlier palatial structures. A Middle Assyrian temple was erected on the high mound, and structures in the vicinity of this precinct yielded an informative batch of tablets from the Middle Assyrian period (Postgate 2001, also Postgate 2013, 260-268). Following a break in occupation towards the end of the 2nd millennium BCE, a Neo-Assyrian temple was constructed in the same area, with associated finds suggesting that the name of the site had changed to Zamahu. While the termination of this settlement is hard to date, it has been suggested that the site was abandoned prior to the downfall of the Neo-Assyrian Empire in 612 BCE (Postgate *et al.* 1997, 41).

16.1 Excavation history

Tall al-Rimah saw prolonged excavations by the then British School of Archaeology to Iraq from 1964-71 under the direction of David Oates. The findings were consistently published in preliminary reports (Howard Carter 1965, Oates 1965, 1966, 1967, 1968a), with full publications of Middle Bronze Age textual finds (Dalley *et al.* 1976) and ceramic horizons, along with updated comments on stratigraphy and architecture (Postgate *et al.* 1997) appearing later. The main thrust of excavations uncovered a couple of substantial Middle Bronze Age monumental structures, namely within the large temple precinct on the main mound (Site A) comprising three general phases of construction extending from the Middle Bronze Age II to Late Bronze Age (Mitanni and Middle Assyrian). In the lower part of the settlement, excavations exposed substantial transects of a Middle Bronze Age II palace (Site C) erected on virgin soil, with an initial phase attributed to Šamšī-Adad and the later to local kings contemporary with Zimri-Lim of Mari and Hammurabi of Babylon (Postgate *et al.* 1997, Dalley 2008, 366). Brief investigations of a third area close to the city ramparts (Area D) found several phases of Late Bronze Age and Iron Age domestic structures, but offers only sparse hints at similar remains dating to the Middle Bronze Age (Postgate *et al.* 1997, 43). As Oates suggested some time ago with specific reference to Tall al-Rimah, the apparently low density of occupational remains in a number of Early and Middle Bronze Age fortified towns across the Jazīrah may indicate a primarily political and military function, as potent seats of power and fortified refuge in times of conflict (Oates 1985).

16.2 Regional surveys

The first extensive survey of the Sinjar region was undertaken by Seton-Lloyd in 1936, and included some 15 sites in the plain south of Tal'Afār (1938, with review of earlier accounts). The British School of Archaeology to Iraq carried out a survey of mounds in the plain concurrent with excavations at Tall al-Rimah in the 1960ies, continued under the supervision of Julian Reade in relation to the later excavations at Tall Taya. Unfortunately, the survey data remains unpublished, though information from the survey files are partially incorporated into Ibrahim's study of Jazīrah settlements (Ibrahim 1986, 60-75). Adding to these datasets are the site gazetteers from the Directorate General of Antiquities (1976), with the district of Tal'afār covered in maps 124-126 (see also Directorate General of Antiquities 1970, 260). The latter source offers no information on dating, however, and incorporates cultural remains from all periods.

Middle Bronze Age settlement patterns of the Afar Plain, as given in Figure 16.96, are corroborated then from several sources. Site locations are collated from the *Atlas of the Archaeological Sites in Iraq* (1976) and the unpublished site gazetteer of the 1964-73 Afar Survey kindly provided by Julian Reade. While the latter index is exhaustive as to the location of sites surveyed by the British School of Archaeology, there exists no updated catalogue of dated pottery assemblages. Since Ibrahim's site catalogue employs periodisations derived from the British survey files (Reade, personal communication 2015), I have identified Middle Bronze Age sites by cross-referencing Ibrahim's data with the Afar Survey site gazetteer. The resulting dataset allows for very general conclusions only, as the dating of pottery horizons are based on arbitrary sampling and rather rough temporal divisions. Further, the emphasis on mounded sites is prone to overlook ephemeral and rural settlements, a type of site that, as seen earlier, should be expected to increase in number and importance during the 2nd millennium BCE.

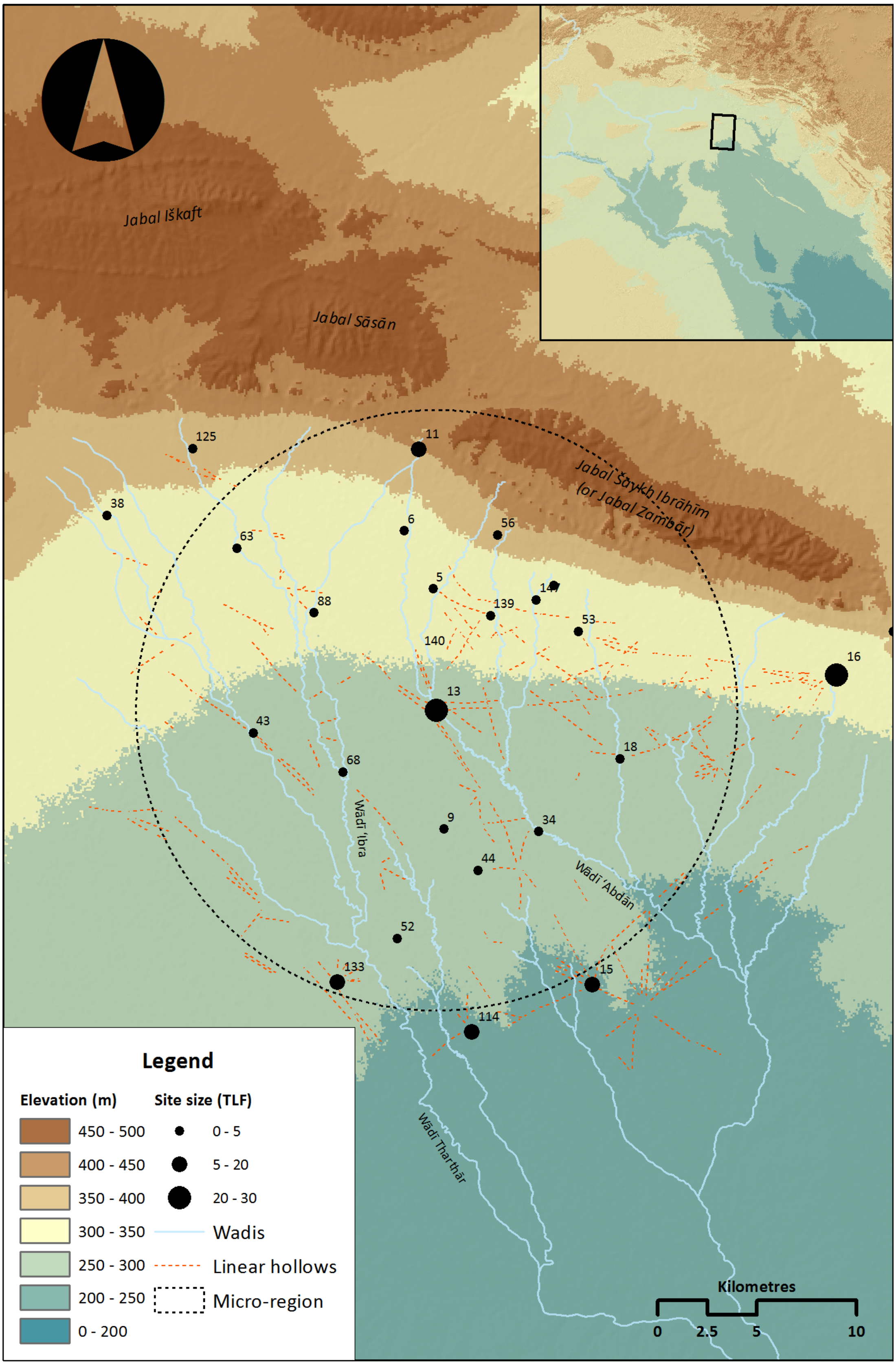


Figure 16.96: Qaṭṭarā (TLF 13) within the ʾAfār Plain and associated Middle Bronze Age micro-region.

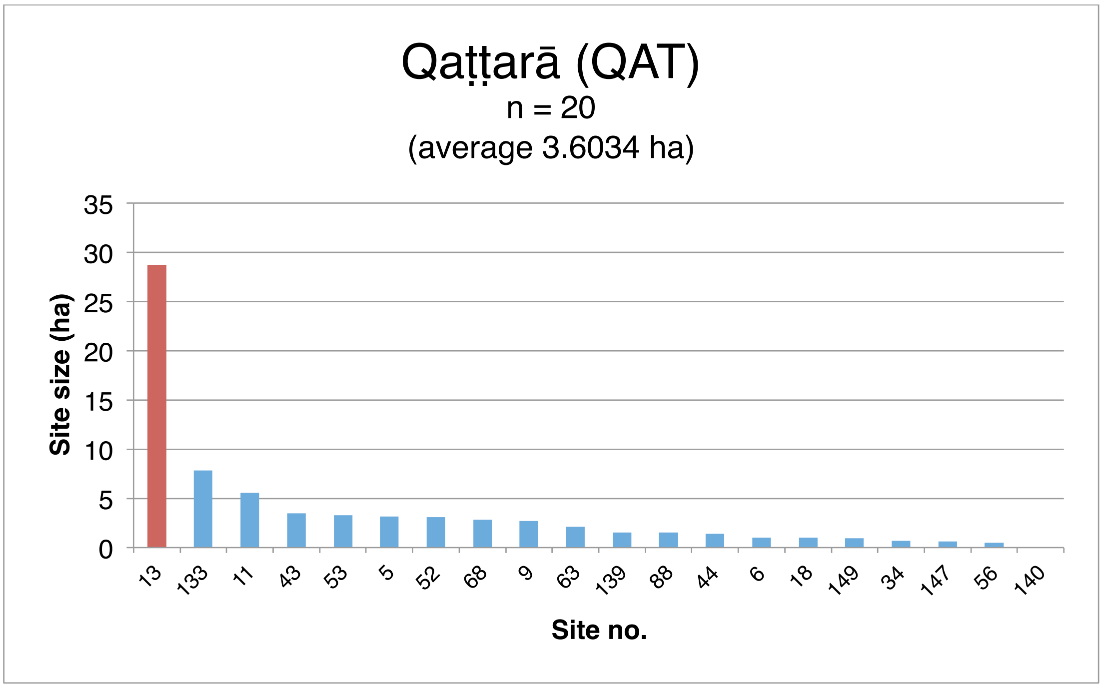


Figure 16.97: Histogram of Middle Bronze Age settlements within the Qaṭṭarā micro-region

Samples of Khabūr Ware or related material are present at a total of 14 sites within the ʻAfār Plain. All of these are mounded sites and all, with one exception, show evidence also of Early Bronze Age occupation. It is interesting to observe that several are walled settlements, of course Tall al-Rimah (30 ha), but also Tall Khamīra (TLF 16, at 27 ha), Tall Ša'ir (TLF 52, at 4.5 ha), Tall Jāsim (LLO 36, at 4 ha) and, likely, Tall Taya (TLF 56, at 0.2 ha). Furthermore, site distribution demonstrates a fairly regular internal ordering, with most sites located on average 5-10 kilometres apart. With the exception of Rimah and Khamīra, all Middle Bronze Age settlements within the plain appear to have been fairly small, in general less than 5 ha in extent. Tall 'Afār (TLF 11), which obviously occupies an important waypoint and furthermore enjoys a perennial water supply from local springs, remains poorly understood within this framework. While the citadel mound holds evidence of Uruk-period occupation (Reade 1968, 235), there is no reference in the literature to Bronze Age occupation at the site, though it is assumed in the present study. The citadel mound extends over some 6 ha.

16.2.1 Tall Khamīra and the location of Karanā

If following the arguments advanced by various authors for an identification of Tall al-Rimah with Middle Bronze Age Qaṭṭarā, we are required to seek out a viable alternative candidate for the contemporary settlement of Karanā elsewhere in the ʻAfār Plain. Nashef has made convincing arguments for an association of the latter toponym with Tall (Abū) Khamīra, a walled mound located some 16 kilometres due east of Tall al-Rimah (1988, 36-39). While Layard's brief soundings at this site in the 19th century CE offer only very sparse pieces of information (Layard 1853, 201-202), surface observations suggests a history of settlement very much alike that observed at Tall al-Rimah, including a walled, lower precinct of a probable Middle Bronze Age date (Oates 1985, 589).

Figure 16.98: Tall Khamīra from Corona 1108 (December 1969) and DigitalGlobe & Bing Maps (c. 2010)

Within the 'Afār Plain, this mound (Figure 16.98) constitutes a more important infrastructural node than Tall al-Rimah, at the very least for Early and Middle Bronze Age periods. Tall Khamīra lies only three kilometres southwest of the pass between Jabal Šaykh Ibrahim and Jabal Šanīn, and effectively guards the passage from the plain eastwards to Mosul. Several linear depressions observable on satellite imagery form a road westward from Tall Khamīra to Tall al-Rimah, and, less clearly, towards the southeast, where roads converge on Tall Būṭīah Šarqīah. This infrastructural framework mirrors very closely Reade's more general observations on the primary routes of movement within the plain in antiquity (Reade 1968, 236-237 and Plate 237). While it must remain speculation, the overall importance attributed to Karanā in the Mari correspondence certainly suggests either Tall al-Rimah or Tall Khamīra, or, more difficult to ascertain, Tall 'Afār to be the modern equivalent. The former is ruled out by the compelling evidence for an identification with Qaṭṭarā. The latter has been suggested to be Karanā by Joannès (Charpin *et al.* 1988, 235), yet without any substantiating discussion of potential evidence. There are no impending reasons for us to assume that Tall 'Afār was an important settlement prior to at least the Iron Age, since Karatepe and Taya would have been the main centres around the pass between the ranges of Sasān and Šaykh Ibrahim in the Early Bronze Age.

16.2.2 Tall Taya

Tall Taya lies on the southern slope of Jabal Šaykh Ibrahim, nine kilometres north of Rimah and six kilometres east of Tal'afār. In extension of work at Tall al-Rimah, the site was excavated under the direction of Julian Reade from 1967-1973 (for a summary, see Reade 1982). The principal settlement levels investigated date from the mid-3rd millennium BCE (Level IX) to the beginning of the 2nd millennium BCE (Level IV-III). While stone foundations of the Early Bronze Age city extend over more than 150 ha, the 19th and 18th century BCE settlement was much smaller. According to the excavator's reports, the Taya Level III settlement (ca. 1800-1700 BCE) was confined to the Early Bronze Age citadel mound, and therefore occupying a modest 0.2 hectares (Reade 1973, 170-173). There is no affirmative evidence as to the ancient name of the settlement, but two Middle Bronze Age cuneiform tablets unearthed at the site give the name of a certain Haṣidanum, and one of them his reception of a field in a locality named Zamiātum. A potential derived meaning of *samiātu* in Akkadian is 'wall foundations', which would fit the Early Bronze Age remains around the settlement rather well. (Reade 1973, 172-175). While this is hardly conclusive, it should be noted that the toponym appears with some regularity at Qaṭṭarā (see for a recent discussion Vollemaere 2016). We find Zamiātum in OBTR 244 and 245, probably to be dated to the first quarter of the 18th century, as the place of origin for members of work-gangs. Later, it appears in an administrative record from the temple precinct listing grain deliveries from settlements (OBTR 226), and in a similar role in (OBTR 316), both from around 1740-1730 BCE

16.3 Textual sources

The Middle Bronze Age cuneiform assemblage from Qaṭṭarā encompass a total 338 tablets and tags[7], which should be subdivided into several distinct corpora. Firstly, we should discern between assemblages from the palatial complex in the lower part of the settlement (Site C), which accounts for 259 texts in total, and those from the temple precinct (Site A), where a total of 79 texts were found. The entirety of this assemblage was edited and published in 1976 (Dalley *et al.* 1976). As will be discussed below, subsequent research has added some substantial correlates to dating and historical context.

[7] I exclude here the inscribed ceramic fragment OBTR 274, the plaque of Šarrum-kima-kalima of Razama (OBTR 277), and the presumably later letter fragment OBTR 341.

16.3.1 Texts from the Middle Bronze Age palace (Site C)

Textual finds from the palace complex derive primarily from the latest architectural phase, with a handful of texts of an earlier date. The latest architectural phase, Phase III (or Level 6, cf. Postgate *et al.* 1997, 30-33) dates to the time after the downfall of Šamšī-Adad around 1775 BCE. This phase is thus contemporary with the reign of Zimri-Lim at Mari and Hammurabi of Babylon, and can be further subdivided into Phase IIIa and IIIb, perhaps marking the transfer of power from Aškur-Addu, an ally of Zimri-Lim, to Aqba-hammu, a client of Hammurabi of Babylon (Postgate *et al.* 1997, 30, also Eidem 1989, 67-69). On historical and archaeological grounds, this divide should follow the fall of Mari in 1763 BCE.

The internal chronology of the Phase III texts supports this historical reconstruction, as all attested eponyms given by administrative texts date to 1759-1755 BCE (REL 214-218). The clustering of the majority of the dated administrative texts in the last attested year, Ṣabrum (REL 218), and the apparent indications of rapid abandonment implied by the distribution of the tablets suggests that the palace came to an end shortly afterwards (Eidem 1989, 69-70).

16.3.1.1 Palace Phase I: Early textual finds

Six tablets were retrieved from contexts below the floors of the Phase III complex, and likely derive from the Phase I structure associated with Šamšī-Adad. These include two tablets from below Room XIV (OBTR 244-245) and three (OBTR 246-248) found close to the southeast corner of the palace, thus at least 40 metres apart (for the latter group, see Oates 1965, 79). The last text is an unintelligible school text from below Room XVI (see summary and references in Dalley *et al.* 1976, 171). The first two are extensive, but very damaged personnel lists, while the latter three curiously enough all seem to relate to the delivery of bricks (Sum. sig4). If summarising all preserved entries at least 2650 individual bricks, and likely running into the tens of thousands. One of the tablets, OBTR 246, contains a fragmentary date formula with the last line giving the beginning of an eponym (r. 12 *li-mu* RI-[x-x]) that should then logically be either Rēš-Šamaš (REL 185 = 1788 BCE) or Rigmanum (REL 189 = 1784 BCE), as no other eponyms contained within the latter hundred years of the REL starts with this sign. Though an intriguing connection to draw, it must remain speculative whether the gathering of bricks from surrounding settlements attested here relate to the initial construction of the palace, and if this should be related to Šamšī-Adad, but the temporal frame seems inviting.

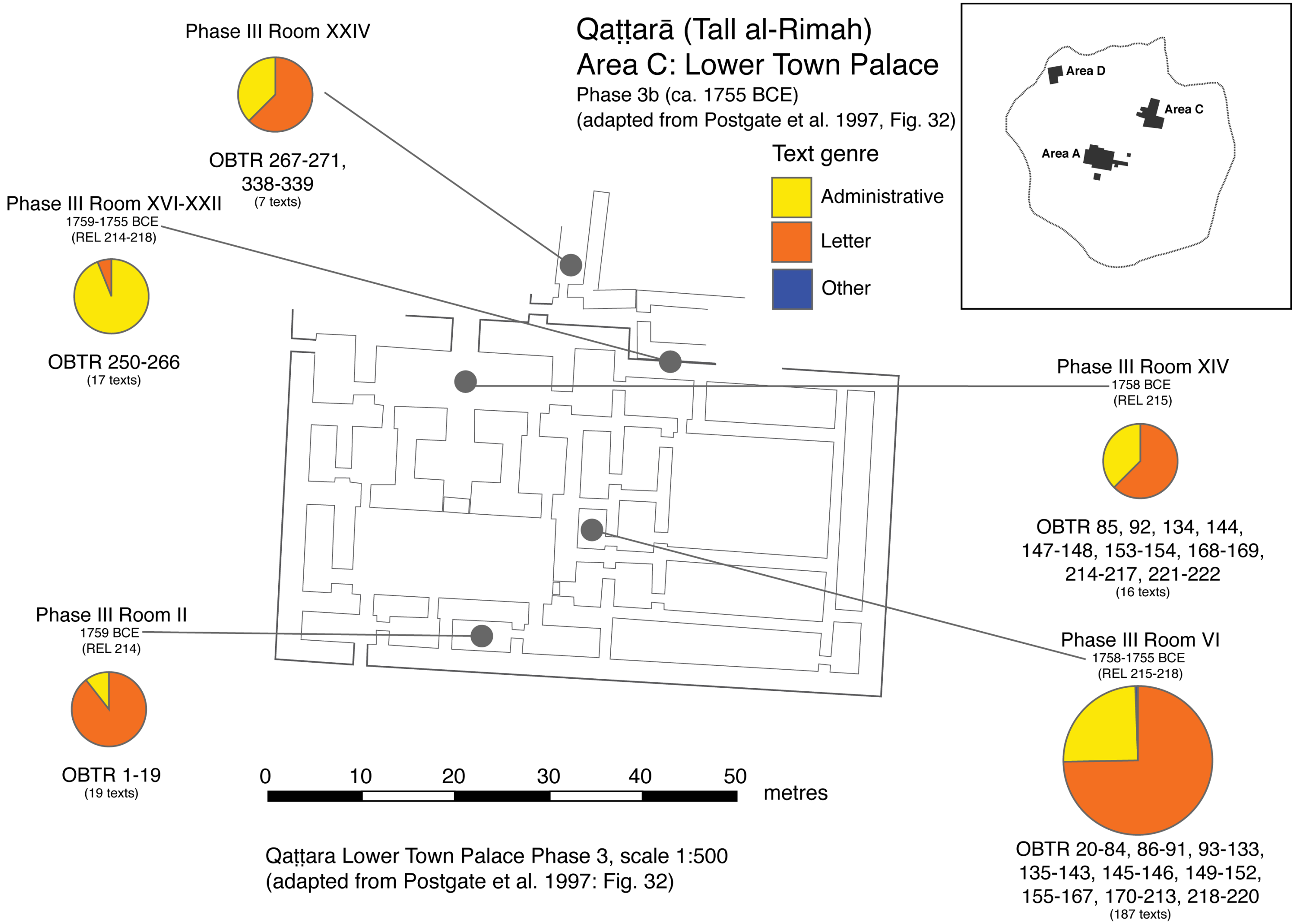


Figure 16.99: Distribution of cuneiform assemblages within the Lower Town Palace (Area C) at Qaṭṭarā.

16.3.1.2 Palace Phase III Room XVI and XXII: The wine accounts

A group comprised of one letter (OBTR 250) and 16 administrative texts (OBTR 251-266) concern the management of wine and was recovered from debris between Rooms XVI and XXII of the Phase III palace complex (Oates 1970, 6). It seems fairly certain that they were discarded here after the palace had been abandoned (Oates 1972, 84), but the group, falling in the range REL 214-218, is contemporary with the assemblage related to Iltani, and the letter is written by her husband, Aqba-hammu, and so is chronologically associated with the bulk of texts from elsewhere in the palace.

16.3.1.3 Palace Phase III Room XXIV: The beer accounts

In Room XXIV, on the eastern side of the presumed palace courtyard, was found a small series of beer records, five in all (OBTR 267-271), along with a fragmentary envelope and illegible remains of another tablet (OBTR 338-339) (Oates 1972, 84-85). None of the texts from this area are dated, though OBTR 339 employs an Old Assyrian dating format, yet without giving a year. Given internal consistencies with texts from Iltani's archive and their potential discard context, mirroring also the wine accounts mentioned earlier, they can however be considered contemporary with the remaining Phase IIIb textual groups. Kizzurum, an individual appearing first as the recipient of beer in all five beer records, is a frequent correspondent of Iltani (OBTR 105-111).

16.3.1.4 Palace Phase III: Iltani's Archive

The largest coherent group of tablets found at the site is the collection of letters and administrative documents belonging to Iltani, retrieved from Rooms VI and XIV of the Phase IIIb Middle Bronze Age palace. This assemblage comprises 150 letters, 52 administrative texts, and one school tablet, and falls within the years immediately prior to the destruction of the palatial complex (Dalley *et al.* 1976, 31-162, see for further comments Eidem 1989, 69-71). The range of attested year names within this group is fairly narrow and confined to REL 215-218 (1759-1755 BCE). Of 38 dated administrative texts from Room VI, 33 are dated to the eponym of Ṣabrum (REL 218), suggesting that the destruction of the palace occurred soon after.

16.3.1.5 Palace Phase III: the correspondence of Hatnu-rapi

Contextual information on this assemblage is sparse. Dalley, in her preliminary reports, merely states, that "on the floor lay a heap of 18 tablets" (Page 1968, 89).

One of the two administrative tablets (OBTR 17 & 18) associated with the letters bears a fragmentary year name, reconstructed as *A-at-ta*? by Dalley (1976, 29-30). Assuming that the eponym in question is Attaya (REL 214 = 1759 BCE, tentatively suggested by Barjamovic *et al.* 2012, 21), the contextual association with correspondence involving Zimri-Lim of Mari, who came to an end some years earlier, is not entirely logical, especially not when considering the possible epistolary references to events in Zimri-Lim's third regnal year (Eidem 1989, 77 and n. 33). I can offer no alternative reading of the year name in OBTR 18. If assuming the letters to be a relict cache of texts either stored or discarded in Room II as hinted at by Eidem, the inclusion of an administrative text dated some ten years later seems more easily acceptable.

16.3.2 Texts from the Middle Bronze Age temple (Site A)

The temple precinct on the high mound (Site A) yielded a total of 79 tablets in two distinctive groups, respectively from Temple Room II and XXIV (21 administrative texts) and from the Temple Stairway (22 administrative texts and 36 letters). Prior to the publication of the Revised Eponym List (Barjamovic *et al.* 2012), these assemblages and the temple structure were thought to predate finds from the palace unearthed in Area C. Reviews drawing on this new chronological framework merit some significant revisions of stratigraphy and historical context (Lacambre and Nahm 2015), which are addressed below. First, I briefly outline the basics of findspot and dating of the assemblages with reference to the revised dating scheme.

16.3.2.1 Temple Rooms II and XXIV

The first group consists of eight administrative texts (OBTR 224-231) found in a broken jar underlying a reinforcement wall postdating the Phase III complex, with a further 11 administrative texts (OBTR 223, 234-243) scattered on the 'original floor' at the opposite end of the room, thus supposedly contemporary with the earliest part of Phase III (Oates 1968a, 119). Three tablets in the latter group preserve year names, namely REL 234 (OBTR 239) and REL 243 (OBTR 234 and 235), thus 1746-39 and 1730 BCE respectively (for datings of the latter two, cf. Lacambre and Nahm 2015). Two further administrative texts (OBTR 232-233) were found in Room XXIV, in debris associated with the end of Phase III (Oates 1968a, 120, note that the reported Babylonian dating formula has since been rejected, see Dalley *et al.* 1976, 167).

16.3.2.2 The Temple Stairway

The last group of tablets, consisting of 36 letters (OBTR 278-313) and 22 administrative texts (OBTR 314-335), was found in occupational debris next to the east stairway leading up to the upper terrace, onto which the main entrance to the temple courtyard opened. Six of the administrative tablets preserve a year name, namely REL 233 (OBTR 315), REL 242 (OBTR 322), REL 243 (OBTR 316-318), and REL 244 (OBTR 314), thus 1746-39 and 1731-29 BCE. There is then a clear chronological overlap between these assemblages and the texts from the temple rooms discussed above, further corroborated by substantive information (cf. Lacambre and Nahm 2015). Excavation accounts demonstrate some disagreement as to the archaeological context, the initial report suggesting either a deposit in a structure on the terrace or a batch of texts thrown out of the temple (Oates 1968a, 121-122). Later reports assert that the assemblage stems from an earlier structure partly disturbed by the supposed terrace wall foundation, which indicates that the texts predate the construction of this structure and also the stairway, but not the temple itself (Oates 1970, 10-11, see also comments in the primary edition of the texts, cf. Dalley *et al.* 1976, 195-196). A summary untangling of datings and stratigraphy is attempted below.

16.3.2.3 The internal chronology of textual assemblages from Site A

Assemblages from the temple precinct have rarely been considered in much detail when juxtaposed with the more celebrated archives from the palace complex (consider e.g. discussions of contemporary material from Šehnā in Eidem 2008a, 267-275, also Eidem 2011a, 3 where the present assemblage is not mentioned). Whiting, some time ago, proposed to date the temple precinct assemblages from Rimah to the earliest years of Šamšī-Adad's reign around 1800 BCE (Whiting 1990, 189-190, reiterated in Charpin and Ziegler 2003, 21). This was a sound argument given the more constrained knowledge of the Old Assyrian eponyms available then, and dating the texts to the beginning of the 18th century BCE furthermore tallied neatly with the established archaeological sequence for the temple complex given by the excavators (summarised in Oates 1982, 91-93). The recent and substantial revisions of the Old Assyrian eponym list, first in the study offered by Günbatti (2008) and shortly after by Barjamovic, Hertel, and Larsen (2012) now provides an almost complete sequence of eponymal years from the early 20th to the end of the 18th century BCE. These important developments fix the assemblage from the high mound to the latter half of the 18th century BCE, namely from c. 1745-30 BCE (Barjamovic *et al.* 2012, 15-17, discussed more extensively by Lacambre and Nahm 2015).

While the original temple is traditionally attributed to Šamšī-Adad, Lacambre and Nahm have, based on a review of the chronological framework sketched in preceding sections, posited a foundation date more recent than the palace in Area C, thus in the latter half of the 18th century BCE (Lacambre and Nahm 2015, 24). I see no reason to go to such lengths, however, since the texts from the temple rooms and the stairway, given their archaeological context, are associated rather with the *termination* of said phase of the temple structure. As dated texts found at the bottom of the temple stairs and inside the temple structure obviously stem from the same assemblage, the only viable hypothesis is that the tablets were thrown out from the temple terrace above (as suggested in the original report, cf. Oates 1968a, 121). The presence of a managerial entity at Qaṭṭarā during the latter half of the 18th century BCE is interesting enough, however. Assuming that occupation in the Lower Town Palace came to an abrupt end shortly after 1755 BCE (REL 218, cf. Eidem 1989, 69-70), resident power structures shifted to the temple precinct and continued to steer a substantial institutional infrastructure encompassing several settlements in the surrounding plains (OBTR 322, the field inventory that formed the basis for my discussion of institutional size in Chapter 10, stems from this late period).

16.4 Analytical groups

Administrative assemblages from Qaṭṭarā then derive from a rather dispersed set of archaeological contexts, further confounded by the divergent periods of use of the palace and temple structures respectively. Analytical groups defined in the present section derive exclusively from the palace structure (Area C) of the mid-18th century BCE. While extremely interesting, administrative records from the temple mound are much harder to relate with regards to formal outlines and subject matter, and further stem from a very disturbed secondary context.

16.4.1 Dossier (Group) QAT 1: Palace grain allotments

This dossier includes six disbursement records dealing with monthly grain rations for palace residents and personnel. The formal outline demonstrates a good deal of parallels with texts included in ASZ Series 6 from Ašnakkum. Two of these records, namely OBTR 207 and 208 are dated and largely identical in terms of form and subject matter. These are included in the derived group QAT Series 1. OBTR 206, 209, 210, and 211 relate to the same set of transactions, but appear to be partial records that may have been subsequently incorporated into the two documents contained in QAT Series 1.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_207_0_0	OBTR_206				TR_PR_VI	Fairly complete
QAT_208_0_0	OBTR_207	0	1	218	TR_PR_VI	Fairly complete
QAT_209_0_0	OBTR_208	2	2	218	TR_PR_VI	Fairly complete
QAT_210_0_0	OBTR_209				TR_PR_VI	Damaged
QAT_211_0_0	OBTR_210	18	10	218	TR_PR_VI	Complete
QAT_212_0_0	OBTR_211				TR_PR_VI	Complete

Table 16.95: Dossier (Group) QAT 1 reference data

16.4.1.1 Series (Group) QAT 1: Palace grain allotments

The two texts included in this series are interpreted as comprehensive accounts of monthly grain rations issued for palace personnel within Iltani's household. The series is discussed in relation to grain ration sizes in 6.7.4.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_208_0_0	OBTR_207	0	1	218	TR_PR_VI	Fairly complete
QAT_209_0_0	OBTR_208	2	2	218	TR_PR_VI	Fairly complete

Table 16.96: Series (Group) QAT 1 reference data

16.4.2 Dossier (Group) QAT 2: Beer grain accounts

This dossier comprises four texts (OBTR 176-179), of which the first three are parallel disbursement accounts of grain and the fourth a supplementary account of outstanding arrears. The dossier is discussed in relation to beer production in 6.7.4.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_177_0_0	OBTR_176	11	2	218	TR_PR_VI	Complete
QAT_179_0_0	OBTR_177	9	5	218	TR_PR_VI	Complete
QAT_180_0_0	OBTR_178	30	8	218	TR_PR_VI	Complete
QAT_183_0_0	OBTR_179	30	8	218	TR_PR_VI	Complete

Table 16.97: Dossier (Group) QAT 2 reference data

16.4.2.1 Series (Group) QAT 2: Beer grain disbursements

This series excludes from QAT Dossier 2 the outstanding arreas contained in OBTR 179, thus limited to the three quarterly disbursements of beer grain to the palace brewer that are identical in format. The series is discussed in 6.7.5.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_177_0_0	OBTR_176	11	2	218	TR_PR_VI	Complete
QAT_179_0_0	OBTR_177	9	5	218	TR_PR_VI	Complete

QAT_180_0_0	OBTR_178	30	8	218	TR_PR_VI	Complete

Table 16.98: Series (Group) QAT 2 reference data

16.4.3 Series (Group) QAT 4: Palace beer allotments

This series comprises five texts recording beer allotments for palace dependents. None of these are dated, and the series may therefore incorporate overlapping accounts. The series is considered in my discussion of beer consumption in 6.7.5.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_332_0_0	OBTR_267				TR_PR_XXIV	Fairly complete
QAT_333_0_0	OBTR_268				TR_PR_XXIV	Complete
QAT_334_0_0	OBTR_269				TR_PR_XXIV	Complete
QAT_335_0_0	OBTR_270				TR_PR_XXIV	Fairly complete
QAT_336_0_0	OBTR_271				TR_PR_XXIV	Fairly complete

Table 16.99: Series (Group) QAT 4 reference data

16.4.4 Dossier (Group) QAT 3: Wine accounts

This dossier includes 16 accounts on the receipt and disbursement of wine within Iltani's household. A series of 11 disbursement records are extrapolated from this group to form QAT Series 3 (see 16.4.4.1). Aspects of this dossier are discusse in relation to the production, circulation, and consumption of wine in 6.10.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_292_0_0	OBTR_251	5		218	TR_PR_XVI	Damaged
QAT_299_0_0	OBTR_252	3	4	218	TR_PR_XVI	Damaged
QAT_298_0_0	OBTR_253	4	4	218	TR_PR_XVI	Damaged
QAT_297_0_0	OBTR_254	28	2	218	TR_PR_XVI	Fairly complete
QAT_293_0_0	OBTR_255	4	3	218	TR_PR_XVI	Fairly complete
QAT_294_0_0	OBTR_256	8	3	218	TR_PR_XVI	Damaged
QAT_296_0_0	OBTR_257	19	3	218	TR_PR_XVI	Fairly complete
QAT_306_0_0	OBTR_258	20	3	218	TR_PR_XVI	Fairly complete
QAT_295_0_0	OBTR_259	21	3	218	TR_PR_XVI	Fairly complete
QAT_301_0_0	OBTR_260		4	218	TR_PR_XVI	Damaged
QAT_302_0_0	OBTR_261				TR_PR_XVI	Damaged
QAT_305_0_0	OBTR_262	6		218	TR_PR_XVI	Damaged
QAT_300_0_0	OBTR_263		7	214	TR_PR_XVI	Damaged
QAT_308_0_0	OBTR_264				TR_PR_XVI	Fairly complete
QAT_303_0_0	OBTR_265				TR_PR_XVI	Damaged
QAT_304_0_0	OBTR_266				TR_PR_XVI	Damaged

Table 16.100: Dossier (Group) QAT 3 reference data

16.4.4.1 Series (Group) QAT 3: Wine disbursements

This series is part of QAT Dossier 3, and includes 11 disbursement records relating to the consumption of wine within Iltani's household. The series is discussed in relation to wine consumption in 6.10.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
QAT_297_0_0	OBTR_254	28	2	218	TR_PR_XVI	Fairly complete
QAT_293_0_0	OBTR_255	4	3	218	TR_PR_XVI	Fairly complete
QAT_294_0_0	OBTR_256	8	3	218	TR_PR_XVI	Damaged
QAT_296_0_0	OBTR_257	19	3	218	TR_PR_XVI	Fairly complete
QAT_306_0_0	OBTR_258	20	3	218	TR_PR_XVI	Fairly complete
QAT_295_0_0	OBTR_259	21	3	218	TR_PR_XVI	Fairly complete
QAT_301_0_0	OBTR_260		4	218	TR_PR_XVI	Damaged
QAT_302_0_0	OBTR_261				TR_PR_XVI	Damaged
QAT_305_0_0	OBTR_262	6		218	TR_PR_XVI	Damaged
QAT_300_0_0	OBTR_263		7	214	TR_PR_XVI	Damaged
QAT_308_0_0	OBTR_264				TR_PR_XVI	Fairly complete

Table 16.101: Series (Group) QAT 3 reference data

17 Šušarrā (Tall Šimšārah)

The site of Tall Šimšārah, Middle Bronze Age Šušarrā, lies on the right bank of the Lesser Zab just west of the Sungāsur Gorge, a narrow gap carved by the river through the mountain range that separates the Bišdar and Rānīah plains. The main mound constitutes an elongated oval that rises six metres above the surrounding plain, with a higher conical mound at its northern end reaching 19 metres at the summit (Figure 17.100).

Figure 17.100: Šušarrā (Tall Šimšārah) from Hunting Aerosurvey (July 1952) and DigitalGlobe & Bing Maps (c. 2013)

I use the Rānīah Plain here in reference to the valley floor on the right (Dašt-i Bitwaīn) and left (Dašt-i Marga) banks of the Lesser Zab. Adding in the Bišdar to the northeast, Šušarrā sits approximately in the middle of a large and fertile alluvial basin extending over some 35 by 35 kilometres, cut in half by the slender, but extremely steep ranges of the Kur-i Raš and the Kurkur Dagh on either side of the Sungāsur Gorge**.** Numerous wadi troughs, of which some are perennial, feed on precipitation runoff from the surrounding mountains and eventually discharge into the river. Though the Dūkān Lake and the introduction of mechanised agriculture have obviously obscured substantial tracts of the past landscape, aerial imagery documents the presence of numerous small lakes and marshy depressions across the more gently sloping western part of the basin. Within a region enjoying an average 500 mm of rainfall annually, this certainly provided for a rich and diverse spectrum of flora and fauna.

The basin straddles a crucial waypoint between the lowland plains around Kirkuk and Erbil and the mountain valleys of the Zagros and the Iranian plateau. In general terms, there are two ways to the high plateau around Lake Urmia and inland Iran from the Erbil and Kirkuk plains; one follows the Greater Zab through the narrow gorges of the Rawandūz (or Rowanduz) and from there towards the passes east of Sūrān, notably the pass of Kīlah Šīn (or Keleshin) on the present-day Iraq-Iran border. The other goes through the Rānīah Plain and across the Bišdar, whence several, but narrow, passes provide access to the Lesser Zab valley beyond the Zagros main crest (Levine 1973, 6-14 and Fig. 11). Within the central Zagros region, the Rānīah Plain constitutes one of the largest upland basins, second only to the Šahrizūr some 120 kilometres to the southeast.

Archaeological investigations indicate Šušarrā to have been inhabited at least from around the 7th millennium BCE. Sparse traces of occupation dating to the 3rd millennium BCE give way to an extensive and architecturally imposing townscape in the beginning of the 2nd millennium BCE. At this time, Šušarrā formed one of the principal towns within the Rānīah Plain, and contained a palace belonging to the local lord along, perhaps, with a small temple precinct on the main mound (Eidem 1992, 13). The surrounding land was referred to in Old Babylonian texts as *māt Utê*, 'the land of the gatekeeper', an apt allusion to the strategic location of the valley below the passes of the Zagros mountain range. Recent investigations have expanded upon the relatively meagre set of archaeological data relating to the Middle Bronze Age settlement, and there now seems to have been in fact several consecutive palatial structures on the main mound throughout the first centuries of the 2nd millennium BCE (Eidem 2013, 9). There is little in the way of indications of occupation post-dating the Middle Bronze Age settlement up until the Medieval settlements of the 14th century CE, except for brief references to Late Bronze Age pottery found on one of the adjacent mounds (Eidem 2011b, 81, cf. Læssøe 2015 [1963], 139-140).

17.1 Excavation history

The Danish excavations took place over three months in the summer of 1957, and focused primarily on the high mound where an extensive sounding investigated a total of 16 levels (XVI-IX). The earliest of these date back to the 7th-6th millennium BCE, characterised by Hassuna and Samarra wares (published in full by Mortensen 1970). Sparse pottery finds may indicate occupation also in the Uruk period (al-Soof 1968, 82). Textual references to a place named Šašrum during the Third Dynasty of Ur very likely refer to Šušarrā, and suggests the site to have been inhabited also towards the end of the 3rd millennium BCE (cf. Eidem 1992, 13 with further references). On the main mound, the prehistoric levels are followed by a series of occupational sequences dating to the Middle Bronze Age, namely levels VIII-IV (ca. 2000-1700 BCE). The three uppermost strata are Medieval Islamic in date (14th century CE, cf. Eidem 2012, 15), and overlies the most recent Middle Bronze Age phase. This rather punctuated settlement sequence is likely an indication of occupational movement back and forth between the high mound and the surrounding tells (Eidem 2013, 7-9). Brief investigations on the lower southern part of the main mound towards the end of the 1957 season exposed a small transect of a Level V Middle Bronze Age palace, dated on textual evidence retrieved there to the first quarter of the 18th century BCE. This is associated with Levels VIII-IV in the high mound sounding, though no detailed study of the material remains are available to further elucidate this connection (Eidem 1992, 11). Further work by Iraqi teams in 1958 and 1959 focused primarily on the palatial structure and cleared extensive tracts of the building. This work remains largely unpublished, however (Læssøe 1960). Details on the archaeological context of the Middle Bronze Age phases VIII-IV are, on the whole, available only in a preliminary form (in reports by Ingholt 1957, and Læssøe 1959) with summaries in the introduction to the primary editions of the tablet finds (especially Eidem 1992, 11-13, Eidem and Læssøe 2001, 13-16, see now also Eidem 2011b, 79-81).

New excavations at Šušarrā, carried out under the direction of Jesper Eidem of the Netherlands Institute for the Near East since 2012, has investigated several phases of the palatial structure on the main mound, probably reaching back into the 19th or 20th century BCE. While no extensive discussion of the results is currently available, some information can be gleaned from preliminary reports (i.e. Eidem 2013, also 2012). The surface extent of the Middle Bronze Age settlement is still only partially ascertained. The 1955 survey investigated the high mound subsequently excavated by the Danish expedition, while the surface area of the lower mound extending towards the southwest was not included. When calculating from the site dimensions given by al-Soof (al-Soof 1970, 67), we arrive then at a settlement of a modest 0.2 ha, which is obviously too little in light of subsequent investigations. In addition to the main mound investigated by Danish and Iraqi archaeologists, recent investigations propose the site to be comprised by multiple additional mounds, namely a similar oblong mound on the west and a smaller outlier on the north, making for a total 10 ha (see the discussion and overview given in Eidem 2011b, 79-81).

17.2 Regional surveys

The Rānīah Plain was surveyed in 1955 in preparation for the construction of the Dūkān Dam (al-Soof 1970, 65). The prepared gazetteer counts a total 40 site numbers, some of which comprise multiple smaller mounds. As will be readily appreciable from the maps given here, the surveyors concentrated on areas threatened by inundation, and further limited investigations to mounded sites. That the plain contains a multitude of smaller and visibly less prominent archaeological sites is suggested by recent salvage survey undertaken by the Netherlands Institute for the Near East (NINO) and the University of Copenhagen. Intensive surface collection from a study area of a mere four square kilometres produced ample evidence of undocumented settlements on the banks of the Dūkān Lake (Skuldbøl and Colantoni 2014, 47). The Rania Plain is only partially covered by the DGAM gazetteers due to the early date of inundation of the valley. The 1976 catalogue comprises maps for the banks of the Lesser Zab within the Bišdar district (Map 75), the eastern bank of the Rānīah Plain around Qara Tepe (Map 76), and the western slopes within the Dūkān District (Map 80).

The initial 1955 survey was followed by trial excavations at several sites expected to be flooded (see Eidem 1992, 54 for a summary). While Šimšārah was investigated by the Danish Dokan Expedition, with further summary inspections also of the mounds of Būskīn and Kūlak (cf. al-Haik 1968, 66), the DGAM carried out archaeological work at major sites further south, namely at Dū Gird Khān, Gird Bardastī, Bazmusian, Qūrah Šinah, Kamāriyān, and Tall al-Daīm (al-Tikriti 1960, al-Soof 1964, summarised in al-Haik 1968, 66-67).

Archaeological evidence of Middle Bronze Age occupation within the basin has been compiled by Eidem in relation to the publication of administrative cuneiform texts from Šušarrā (1992, 54-56 and Map 52). With some additional comments, this overview forms the basis for the settlement dataset utilised in the present study (Figure 17.101). The smaller mound at Tepe Gawran (al-Soof 1970) is supposed to have contained remains of an Assyrian structure on the summit, yet Eidem apparently does not include this site in his map of Middle Bronze Age sites in the plain (Eidem 1992, 54-55). Supposing that 'Assyrian' here refers to a Middle or Neo-Assyrian structure, this has been left out of the present dataset. It should be noted that several ongoing survey projects are likely to alter impressions advanced here altogether.

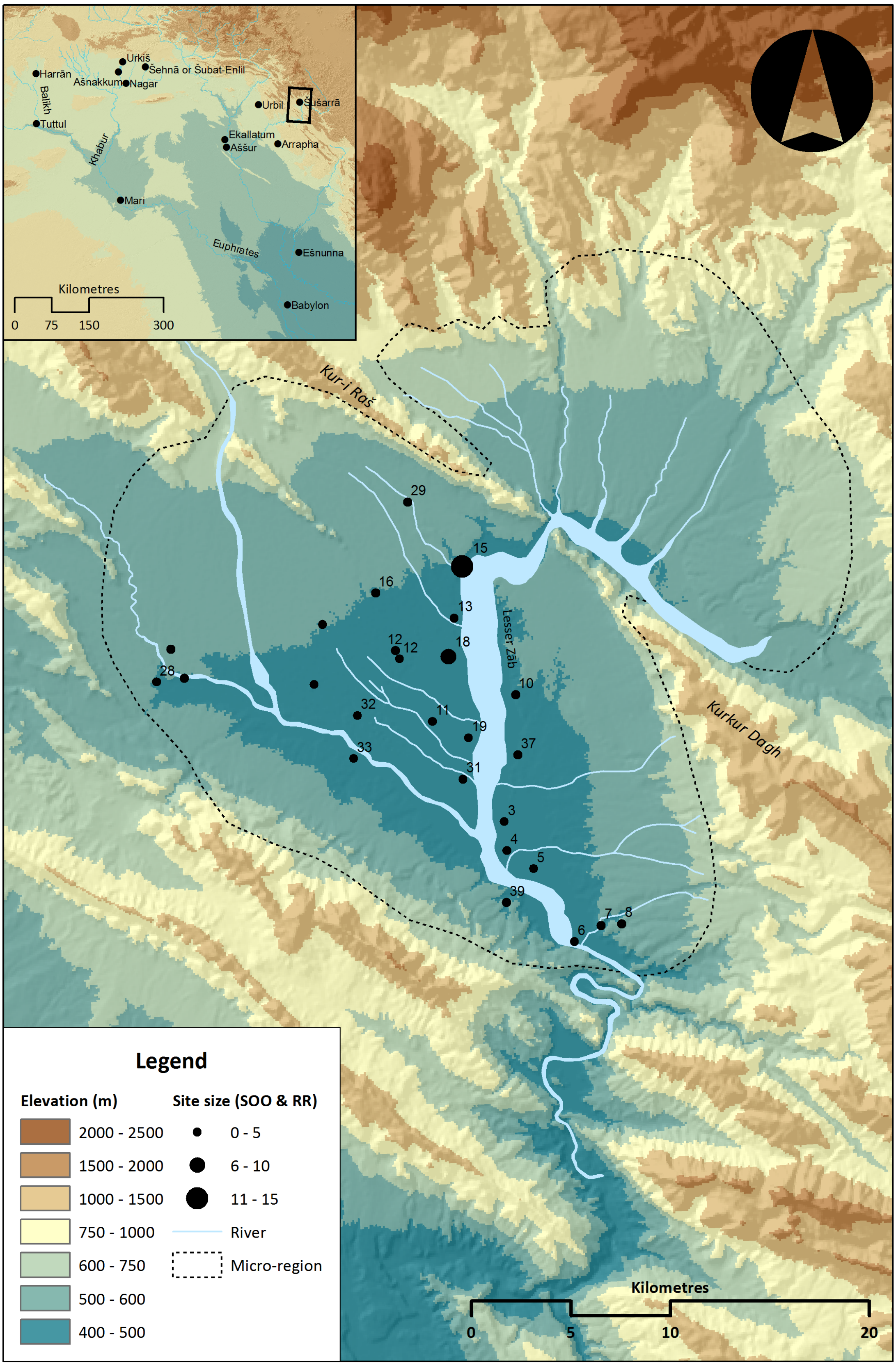


Figure 17.101: Šušarrā (SOO 15) and associated Middle Bronze Age micro-region

The survey conducted by researchers from the University of Copenhagen has been investigating the Rānīah Plain within a radius of 15 kilometres from Tall Šimšārah in recent years (T. Skuldbøl 2016, personal communication) while concurrent investigations by the Sulaimaniya Governorate Archaeological Survey are mapping sites throughout the Rānīah and Bišdar plains (J. Giraud 2016, personal communication). No firm syntheses of these findings are as yet available in a published form.

As seen in the above discussion relating to Tall Šimšārah, site dimensions given in the 1955 survey appear to relate exclusively to substantial mounds, with potential traces of topographically less prominent outliers rarely mentioned. Due to the early date of construction of the Dūkān Dam, satellite imagery is largely unable to verify the extent of inundated sites. Revised area measurements (used in Figure 17.102) given in the present dataset are derived from aerial imagery taken by Hunting Aerosurveys in 1951-52, kindly provided by Dr. Arsalan Othman Aljaf of TU Bergakademie Freiberg. Taken from an altitude of ca. 5-7 km with excellent aerial reconnaissance equipment, these images document the Rānīah Plain in its entirety at a resolution of 5-2 metres at ground level (see 4.3.1.2).

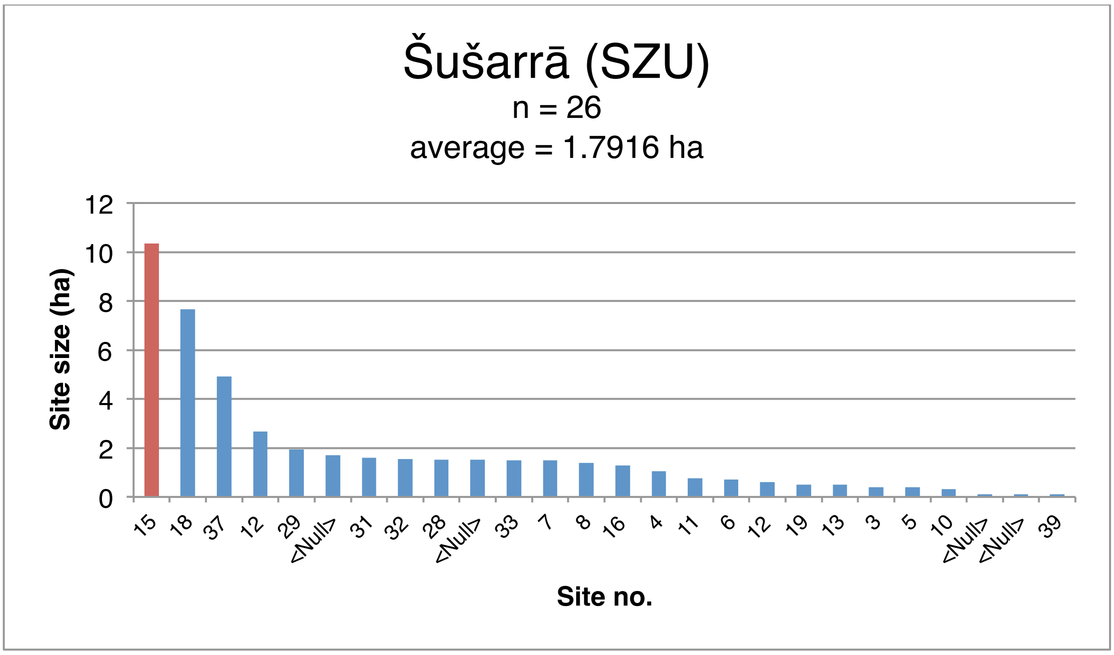


Figure 17.102: Histogram of Middle Bronze Age settlements within the Šušarrā micro-region

17.2.1.1 Tall Bazmusian

Tall Bazmusian lies in the centre of the Rānīah Basin, just short of five kilometres downstream from Šušarrā. The mound sits on a natural escarpment above the junction of two wādī streams that converge on its eastern side before descending on the Lesser Zab some 700 metres to the east. The entire site is at present inundated by the Dūkān Lake. Due to the declining water table, recent archaeological survey has been able to photograph the higher central tell, and also to document the extensive damage wrought upon archaeological strata by oscillations in the water table. In his account of the 1955 survey, al-Soof gave the circumference of the mound as 1500 m, with a summit rising 23 m above the surrounding terrain (al-Soof 1970, 67). The derived surface extent would be close to 18 ha, which diverges from estimates from contemporary aerial imagery taken by Hunting Aerosurveys. Here, the main mound with lower slopes seems to extend over some 7.5 ha only. Brief excavations were carried out at the site in extension of the 1955 survey, and a summary of the findings accompanies the survey report prepared by al-Soof. Bearing in mind the rather coarse resolution of the presented dataset, let us consider the regional settlement landscape. With an aggregate total of some 10 ha, the multiple mounds of Šušarrā evidently constitute the largest single site within the valley. Bazmusian is a close second when estimated from aerial imagery (7.5 ha), and would have been even larger if following the dimensions given in the survey report. The available photographs do, however, not suggest a size exceeding ten hectares posited by al-Soof.

17.3 Textual finds

Published finds of cuneiform tablets from Šušarrā derive exclusively from the Level V (early 18th century BCE) palace structure on the lower southern part of the main mound (but note the recently found administrative tablet from an earlier, likely 19th century BCE context appearing in Eidem 2013, 11 and Fig. 15). The cuneiform assemblage was retrieved over two separate field seasons. A fortnight's work towards the end of the 1957 season of the Danish Dokan Expedition uncovered a combined assemblage of letters and administrative texts from Room 2 in a structure reached trough a small sounding on the lower central part of the main mound (Eidem's Archive 1, cf. Eidem 1992, 14). This group was comprised of 91 letters (published in Eidem and Læssøe 2001), 42 administrative texts, and three fragments of unknown type. Expanding excavations on the lower part of the mound, Iraqi archaeologists unearthed a further 106 administrative texts and one letter from Rooms 27 and 34 in the following years (Eidem's Archive 2). The archaeological context of this assemblage is relatively poorly documented (see for a preliminary report Læssøe 1960, also the review in Eidem 1992, 14-15), but the texts evidently derive from the same palatial structure, and are further contemporary with the 1957 texts based on internal information. Room 27 contained 36 administrative texts (three of which are classified as legal here, since they record commodities owed). Room 33 contained 70 administrative texts (again, three loan documents are classified as legal) and one letter. Læssøe's description of the archaeological context, corroborated by preliminary ground plans of the Phase V palace now available (see http://www.nino-leiden.nl/projects/rania-plain-tell-shemshara), indicates Archive 2, found in Room 2, to have been stored in a room east of a large, central courtyard. Archive 1, in contrast, was placed in two rooms on the south side of the courtyard (Læssøe 1960, 13).

17.4 Analytical groups

The administrative assemblages from the palace structure include documentation on a range of agricultural and animal products, though their analysis is hampered by the lack of a proper chronological framing and a, sometimes, insufficient understanding of metrologies. The only analytical group included here relates to harvest yields from surrounding villages.

17.4.1 Dossier (Group) SZU 1: Harvest accounts

The dossier includes a total of 19 documents, primarily from Room 27 and 34. All of these relate to harvest yields, and are discussed accordingly in relation to agricultural practices in Chapter 8. The dossier also forms the basis for calculating institutional scale in Chapter 10.

Major_ID	Detail Data Source	Day	Month	Year	External_ID	Preservation Assessment
SZU_8_0_0	SH2_008				SH_Room_27	Complete
SZU_24_0_0	SH2_024				SH_Room_27	Complete
SZU_25_0_0	SH2_025				SH_Room_34	Fairly complete
SZU_26_0_0	SH2_026				SH_Room_34	Fairly complete
SZU_37_0_0	SH2_037				SH_Room_34	Complete
SZU_38_0_0	SH2_038				SH_Room_34	Damaged
SZU_39_0_0	SH2_039				SH_Room_34	Fairly complete
SZU_41_0_0	SH2_041				SH_Room_34	Fairly complete
SZU_42_0_0	SH2_042				SH_Room_34	Fairly complete
SZU_43_0_0	SH2_043				SH_Room_34	Fairly complete
SZU_48_0_0	SH2_048				SH_Room_34	Fairly complete
SZU_98_0_0	SH2_098				SH_Room_34	Damaged
SZU_108_0_0	SH2_108				SH_Room_02	Complete
SZU_60_0_0	SH2_060				SH_Room_34	Damaged
SZU_65_0_0	SH2_065				SH_Room_34	Damaged
SZU_67_0_0	SH2_067				SH_Room_34	Damaged
SZU_79_0_0	SH2_079				SH_Room_27	Damaged
SZU_83_0_0	SH2_083				SH_Room_34	Damaged
SZU_88_0_0	SH2_088				SH_Room_34	Damaged

Table 17.102: Dossier (Group) SZU 1 reference data

Appendix 2: Metrology

As noted in 5.2.8, the dataset integrates quantitative information in its native form. Conversion of Middle Bronze Age measuring units to modern equivalents of volume, weight, and area have been made according to equivalencies drawn from specialist literature. As the textual assemblage spans several different metrological traditions, this appendix provides a concise overview of units encountered, their internal relationship and social context, and discussion of their conversion to modern values.

A wide variety of measuring systems were employed in the Bronze Age Ancient Near East (see for an overview of metrologies in the cuneiform record Powell 1990). These differ both with regards to internal notation, usage, and absolute value. Bulk dry and liquid commodities, such as crops, flour, salt, beer and wine were chiefly accounted for in capacity measures. Other types of goods, notably metals and wood, were weighed (see for global archaeological and anthropological perspectives e.g. Morley and Renfrew 2010, for the Bronze Age Eastern Mediterranean, see articles in Alberti *et al.* 2007, for a recent synthesis on Bronze Age metrologies in the Jazīrah, see Chambon 2009b).

In the period under consideration here, there is some degree of metrological standardisation, particularly in the alluvial plain. This is related primarily to the development of a uniform system of scales during the Early Bronze Age First Dynasty of Akkad (ca. 2400 BCE). The Akkad system of measure, with some modifications, remained in widespread use into the beginning of the Iron Age (Powell 1984a, 66). In the north, this system is attested at Gasur (Nuzi) from the 24th century BCE onward, though the extent of its use is a disputed topic, as indigenous capacities also occur. During the Middle Bronze Age, several metrological institutions centering respectively on the Bilād al-Šām, the Jazīrah, and the alluvial plain are attested (Powell 1990, 499).

18 Capacity measures

We will begin with systems of capacity, as these are used in the measuring of dry goods and liquid, and therefore the principal units found in the dataset (and in the administrative cuneiform record more generally). As noted by Powell, the standardisation of capacity measures is much more cumbersome to enforce in comparison with length or surface measures, and so one should expect, or at least not rule out, a substantial degree of local variation with regards to the value of specific measures (Powell 1990, 493). Established capacity measures most likely predated writing further south, and there is little reason to suspect that similar practices should not have been in place in the north prior to the beginning of the 3rd millennium BCE (for an updated summary of capacity measures in the Early Bronze Age, see Chambon 2009b, 48-66).

18.1 The Jazīrah

In the Jazīrah and across the Tigris, bulk measures of dry goods were based on the donkey-load (Sum. anše, Akk. *imēru*), traditionally attributed to a western, Amorite tradition (Powell 1990, 500). The *imēru* followed a decimal notation, thus corresponding to 10 *sūtu* (Sum. ban_2), with the *sūtu* again being divided into 10 *qû* (st. abs. *qa*) (Sum. $sila_3$). The importance of the donkey-load as a benchmark unit across the Jazīrah is underlined by its incorporation into several different metrological traditions, also those stemming from the alluvial plan, which were sexagesimal in structure.

Unit				
anše	1			
ban_2	10	1		
$sila_3$	100	10	1	
gin_2	600	60	6	1

Table 18.103: The donkey-load and related units in use in the Middle Bronze Age Jazīrah

18.2 The Tigris and the Middle Euphrates

A more archaic system was in use at Aššur on the Tigris. The Old Assyrian 'sack' (Akk. *naruqqu*), equal to four 'pots' (Akk. *karpu*), was likely equivalent to 120 $sila_3$, or two barig, a measure much used on the Middle Euphrates as the Mari gur, equal to 120 *qa* (Powell 1990, 499-500). Some interesting features of Old Assyrian metrology are maintained at Šušarrā, namely the extensive use of the three *sūtu* (Sum. baneš, Akk. *simdu*), corresponding to the 'pot' (Akk. *karpu*) found at Aššur (Eidem 1992, 26-27). While the donkey-load is the major unit of volume measure in the plains, it is more haphazardly attested in the Middle Euphrates Valley. In the latter area, the same slot is occupied by Akk. *kurru* (Sum. gur), subdivided into two barig (Akk. *pānu*). In contrast to the gur used in the alluvial plain, which generally equals 300 sila$_3$, the 120 sila$_3$ Mari gur seems influenced by a metrological milieu closer to the Amorite *imēru* and the Old Assyrian *naruqqu* (Powell 1990, 500).

Unit						
a-gar$_3$	1					
gur	10	1				
barig	20	2	1			
ban$_2$	120	12	6	1		
sila$_3$	1,200	120	60	10	1	
gin$_2$	-	-	3,600	600	60	1

Table 18.104: Capacity measures in the Middle Bronze Age Middle Euphrates Valley

18.3 Alalah and the Bilād al-Šām

Another notation is used extensively at Alalah, especially in the grain disbursement records where the *pārisu*, barring a few exceptions, is the only measure in use (Zeeb 2001, 200). As fractions employed in these texts suggest the measure to be part of a sexagesimal system, and further to correspond with some qualification to a monthly ration of grain for one person, the *pārisu* is almost certainly equal to the Middle Euphrates Sum. barig, and thus equal to 60 sila$_3$ (Zeeb 2001, 200-210).

18.4 Absolute capacity measures

Defining the absolute value of Bronze Age capacity measures can be difficult, as local variation is a significant and largely unavoidable factor (Chambon 2009b, 173, Brunke 2011b, 6-8, Reculeau 2011, 121-127). This study assumes a more optimistic stance by assuming that a regional focus allows us to correlate otherwise unreliable singular pieces of evidence. A high level of accuracy is obviously desirable, but we should accept a certain margin of error rather than abstain from asking questions at all. With regards to the Middle Bronze Age II Jazīrah, absolute capacity values hinge on the study of an inscribed jar from Qaṭṭarā, which establishes an absolute value for 1 *qa* in the measure of Šamaš (giš-ban$_2$ *Šamaš*) as 0.8 litres, with a 2% margin of error (Postgate 1978, also Chambon 2009b, 25-28 for a brief overview of general research history). Powell has subsequently established the relationship between the measure of Šamaš and the ‘domestic’ or the *kinâte*-measure as 1:1.5 (Powell 1990, 500-501, further strengthened by van de Mieroop 1994, 311, for critical observations, see Chambon 2009b, 139). Textual and material evidence from Tall Līlān further corroborate the absolute value of the *kinâte*-measure. In a study of the ceramic assemblage from the Qarni-Lim Palace, Pulhan identified a standardised vessel type with a volume capacity of 2.4 litres. This measure closely resembles a common size of allotment given in the beer disbursement records found in the same building, namely 2 *qa* in the *kinâte*-measure, which the measure from Rimah, following Powell's observations, would suggest to be 2.4 litres (Pulhan 2000, 159-164).

While none of these observations are, by themselves, empirically secure, they are logically suggestive when considered in juxtaposition. Local variation with regards to the naming of specific measures may be viewed as particular expressions of a general and diffused metrological institution, thus Powell's proposal to equate locally specific measures such as the 'ration-' (giš-ban$_2$ še-ba), and 'tax'-measure (giš-ban$_2$ *šibši*) at Qaṭṭarā with the measure of Šamaš and the *kinâte*-measure respectively (Powell 1990, 501). As Chambon has pointed out, the two measures from Qaṭṭarā in fact stand in the opposite relationship to each other (2009b, 100-102), which raises some more complex issues with regard to their absolute value. Judging from average grain ration sizes, e.g. OBTR 315, the 'ration measure' appears to be of the same absolute value as the *kinâte*-measure, and has been maintained as such in the table below. The internal relationship between the ration and *šibšu*-measure then implies the latter to have an absolute value of 1.6 litres, which brings us close to the absolute value of a Middle Assyrian *qa* attested at Tall Huwīra west of the Khabūr (Bösze 2010, but see Reculeau 2011, 125-127 for a critical discussion). I maintain the conversion value for the *šibšu*-measure in the table below, but the matter requires a more extensive discussion than can be provided here.

There are no available material correlates by which to approximate the modern value of the Alalah *parīsu*, though it most likely contained 60 *qa* and therefore roughly 60 litres. The standard ration size derived from the grain disbursement records found there appears to be one *parīsu* per person per month, a figure that, when compared with grain rations in the Jazīrah, suggests the *parīsu* to be equivalent to 48 litres, i.e. with a *qa* to litre ratio of 1:0.8, in contrast to the *kinâte*-measure's 1:1.2. It should be noted that this interpretation brings the absolute value of the Alalah *parīsu* very close to the Biblical *lmlk*, which contained c. 45 litres (Kletter 2014). Middle Bronze Age wine jars unearthed at Tel Kabri, on the Mediterranean coast are estimated to contain c. 50 litres each (Koh *et al.* 2014). In light of the above discussion, let us briefly summarise conversion values for capacity measures as employed in the present study. Where no absolute value can be established, the *qa* to litre ratio is given in italics (Table 18.105).

Data Type	Detail Data Type	Description	*qa*/litre
Metrological (Reference)	$^{\text{giš}}$ban2 *Šamaš*	'measure of Šamaš', closely related to the Kingdom of Upper Mesopotamia, but also in use at Šehnā later in the 18$^{\text{th}}$ century BCE (cf. Chambon 2009, 137-142)	1:0.8
	$^{\text{giš}}$ban2 *kinâte*	'measure of the menials', widely used in the Jazīrah throughout the 18$^{\text{th}}$ century BCE.	1:1.2
	$^{\text{giš}}$ban2 *šibši*$^{\text{QAT}}$	'*šibšu*-measure', appearing only at Qaṭṭarā here, but known also from Mari (cf. Chambon 2009, 101-102)	1:1.6
	$^{\text{giš}}$ban2 še-ba$^{\text{QAT}}$	'grain ration measure', a standard used at Qaṭṭarā, but found also at Sippar in the northern alluvium	1:1.2
	$^{\text{giš}}$ban2 ki-lam$^{\text{SZE}}$	'market' or 'exchange' measure. A few examples from Tuttul and Šehnā.	*1:1*
	$^{\text{giš}}$ban2 *mahīrti*$^{\text{TUT}}$		
	$^{\text{giš}}$ban2 *bīti*$^{\text{SZU}}$	'measure of the house', a single occurrence at Šušarrā.	*1:1*
	[unknown]	Measure not given.	*1:1*

Table 18.105: Capacity measure Detail Data Types contained in the data set and their *qa*/litre conversion.

18.4.1 Notes on pottery vessels (*karpatu* and *pihu*)

The modern capacity equivalent of two specific vessel types cannot be established with certainty, and we should briefly go over the proposed equivalences and the problems generated with regards to our dataset. The 'jar' (Sum. dug) is amply documented as a measure of liquids, namely beer and wine. The Akkadian equivalent is *karpatu*, though this latter term is not widely encountered in administrative documents from the Middle Bronze Age II Jazīrah. Citing studies on administrative texts from Mari, Vincente has suggested *karpatu* to refer to a standardised container with a measure of 1 ban$_2$ equal to ca. 10 litres (Vincente 1991, 299). Citing ATaB 43.14, and without reference to the former case, Zeeb calculates the capacity indicated by the same term (Sum. dug) at Alalah to be 1 ban_2 (Zeeb 2001, 200 n. 368). The term is, however, subject to some variation with regards to absolute measure when considered through other assemblages. Two inventory records from Qaṭṭarā concerned with oils and other precious commodities (OBTR 204 and 205) list pots (Sum. dug) of 2 and 3 ban_2, while a *kutu*-vessel (Akk. ^{dug}*kutu*) is stated to hold 5 ban_2. We might assume that the scribe found it necessary to note their size precisely because they deviated from a standard of 1 ban_2, but this is hardly a conclusive observation. Powell has offered an insightful, yet still inconclusive discussion of jar capacities at Mari based on price equivalencies for wine, which suggests a wine jar (Sum. dug) to contain 20-30 litres (Powell 1995, 110).

A second vessel is Akkadian *pihu*, a noun used for a liquid container employed in the disbursement of beer at Ašnakkum, Šehnā, and Tuttul (see Lacambre 2008b, 175-176 with further references). That the *pihu* can be used to account for absolute measure is indicated e.g. by L91-822 (cf. van de Mieroop 1994, 330), where jars are allotted according to the *kinâte*-measure, but further information on its exact capacity is contradictory. At Tuttul, references to *pihu*-vessels give the capacity as 1 ban_2 or 2 ban_2 (cf. KTT 103 and 311 respectively, with similar examples from Mari, cf. Lacambre 2008b, 175). Returning to the disbursement records from Ašnakkum, CB III 167 complicates things. Here, a certain Iddin-Dagan receives "1 *sūtu* of good beer, 1 *pihu*-vessel of good beer" (CB III 167 r.01-02), with the implication that a pihu-vessel is not commensurable with 1 *sūtu*, and, judging from the ordering, probably smaller. A letter from Qaṭṭunan on the Khabūr River implies that a subtle distinction in terms of scale is maintained between the *pihu*-vessel and Sumerian dug, although the latter may here refer to another type of jar:

> "Thus my master wrote to me: "Why are you complaining about your allowance (Sum. sa_2-sag)? Ibal-pi-El is entitled to one *pihu*-vessel and one *mazê*-jar more than you. Now, do not complain about this and accept the allowance!"
>
> (ARM 27, 152 v.04-08).

Neither Sumerian dug nor Akkadian *pihu* are ever converted into other metrological units, and shows no regular agreement with known measures. As the above survey indicates, it is hard even to assign an approximate value. As both types are used extensively in allotment of beer to individuals, it seems reasonable to expect a capacity at 1 *sūtu* or below, but this must remain speculative for the time being. Given the rather limited number of entries that utilise these measures, I exclude resources measured in Sum. dug or Akk. *pihu* in analyses relating to the present dataset. An exception is made with regards to wine (6.10).

19 Weight measures

Systems of weight measure in the Jazīrah follow notation structures seen in the alluvium also. In our dataset, the common range of units employed includes the talent (Sum. gu2, Akk. *biltu*), the mina (Sum. ma-na, Akk. *manû*), the shekel (Sum. gin$_2$, Akk. *šiqlu*), and the grain (Sum. še, Akk. *uṭṭatu*) (Powell 1990, 510 and 514-515). We should expect some regional variation between these and modern equivalents (but see for recent studies focusing on Mari e.g. Bry 2005, Chambon 2009b, 143-146), yet the internal notation is well known and, following widespread scholarly practice, we assume a shekel to equal eight grammes.

Unit				
gu2	1			
ma-na	60	1		
gin$_2$	3600	60	1	
še	648,000	10,800	180	1

Table 19.106: Weight measure Detail Data Types in the dataset

20 Surface measures

Surface mensuration in the Middle Bronze Age Jazīrah and beyond relies in part on units related to the southern alluvium, while incorporating also more native elements. The principal surface unit in use in the dry-farming plains is the 'dike' (Sum. iku, Akk. *ikû*), which, if assuming a measure similar to that found in the alluvium, equals ca. 3600 m^2, or 0.36 ha (Powell 1990, 486, also Postgate 2013, 56, questioned, though not convincingly, for Middle Assyrian contexts by Reculeau 2011, 122). While this surface measure is amply attested in a few texts in the current dataset, the subordinated unit, the 'garden plot' (Sum. s/šar, Akk. *mušaru*), is quite rare (but see e.g. OBTR 322).

Unit		
iku	1	

sar	100	1

Table 20.107: Surface measure Detail Data Types in the dataset

Appendix 3: Chronology

The ordering of analytical groups found in the textual dataset relies on the correct understanding of Middle Bronze Age eponymal lists and calendars. In the following, I give first some brief consideration of absolute chronology, i.e. how year names appearing in the administrative record is linked to absolute years. Second, I proceed to discuss in more detail year calendars appearing in the dataset, followed by a review of dating practices acoording to months and days within the agricultural year (see also 7.1.4).

21 Chronological frameworks

The integration of native chronologies of the Iraqi alluvium, the Jazīrah, the Bilād al-Šām, Anatolia, Egypt, and the Mediterranean has seen intense debate recently, and a clarification of the various views on the relative and absolute timing of events, albeit not exhaustive, is necessary if one wishes to place the documentation used here in an absolute temporal frame. The absolute dating of events pertaining to the first half of the 2nd millennium BCE currently hinges on the length of the only partially charted transition between the Middle Bronze Age (c. 2000-1600 BCE) and the Late Bronze Age (c. 1600-1100 BCE). East of the Mediterranean, absolute chronologies are established with reference to the time elapsed between the end of the First Dynasty of Babylon and the rise of the Middle Assyrian kingdom. The precise length of this interlude has been vividly discussed in recent years. Through a critical revision of the Middle Chronology (MC) (see Brinkman 1964, for a standard timeline), Gasche and others have argued for a lowering of the benchmark date for the 1595 BCE (MC) fall of Babylon to Hittite incursions with 96 years, to 1499 BCE. This new chronological framework, based on the combined examination of astronomical observations, ceramic typologies and horizons, and re-examination of textual evidence, is labelled the New Chronology (NC) (Gasche *et al.* 1998). The argumentation fails, however, to accommodate for C^{14}-datings.

Similar investigations focusing on the historical chronology of Egypt and the Eastern Mediterranean have issued calls for a lower dating (Low Chronology, or LC) of the Thera (Santorini) eruption to c. 1525 BCE (Cherubini *et al.* 2014), while others have defended a higher date (High Chronology, or HC) commensurate with the MC (see above) dating the eruption to c. 1610 BCE (Manning *et al.* 2014). While the Egyptian dynastic chronology remains rather firmly fixed, intermediate periods, and the potential overlap of individual rulers or dynasties, generate uncertainties that have only recently been examined using scientific dating methods (Bronk Ramsey *et al.* 2010, Dee *et al.* 2012). Based in particular on excavations at Tall al-Dab'a, analyses of Egyptian ceramic horizons and purported synchronisms with the Bilād al-Šām have led others to support the LC (Bietak and Czerny 2007).

In general, arguments for an overall shortening of the time elapsed between the end of the 17th and the beginning of the 14th century BCE suffer from an unsatisfactory discussion of the discrepancy between the proposed historical chronology and C^{14}-dates. Combined studies of dendrochronological data and associated radiocarbon analysis from Anatolia agree with the HC proposed for the Thera eruption (Kuniholm *et al.* 2005). The dendrochronological sequence has recently been related to cuneiform texts from Old Assyrian trading colonies at Kaniš (Kültepe) in central Turkey (Barjamovic *et al.* 2012). The latter study is significant in that it enables a parallel examination of dendrochronological, astronomical, and radiocarbon datasets, and relates these to Middle Bronze Age dating systems utilised in the Jazīrah and on the Tigris. The authors demonstrate that the MC offers the only sound chronological framework able to integrate scientific, astronomomical, and historical dating schemes. A recent review of dendrochronologies and associated datasets has added relatively minor corrections to this scheme, and further strengthened its association with the HC proposed for the Eastern Mediterranean and new datings of the Egypt dynastic chronology (Manning *et al.* 2016, 20-22). While the application of an absolute chronological framework is not critical to analyses of the administrative texts undertaken here, discussions of the historical period in this study employ traditional MC dates.

21.1 Dating practices

I consider native dating systems appearing in the textual dataset from the perspective of the administrative record. Means of dating, in effect the ancient counterpart to the modern practice of serially numbering administrative documents, forms a critical basis for considering the way in which archives or dossiers of texts were formed and managed (Postgate 2013, 51-53). In practice, any administrative document could be dated to a particular day of a particular month of a particular year. Some records, namely wine disbursements (6.10), exhibit an even higher degree of temporal resolution by ordering individual issues with reference to morning (Akk. *šērtu*) and night (Akk. *mušu*) (e.g. L87-352, cf. Ismail 1991, 54-55), a manner of indexing echoed in issues for the 'king's meal' at Mari (Sasson 2004, 185). Others accounted for monthly, rather than daily transactions, and therefore sometimes omit the day altogether. At Alalah, the practice of discarding administrative dossiers on a yearly basis is reflected by the omission of year formulas, e.g. in the grain disbursement records (Zeeb 2001, 170). Such accounting preferences are naturally linked to the resources in question. Grain ration disbursements, e.g. at Alalah or Ašnakkum, were accounted for month by month, whereas beer, not able to last for more than a week (cf. 6.7) was given out in daily disbursements. The rigidity in accounting procedures for wine evidently owed to its extremely high exchange value (Powell 1995, 101).

Dating practices are also regionally specific. The characteristics given above apply primarily to assemblages from the Jazīrah and relied on the Old Assyrian dating system in use at Assur. Further east, at Šušarrā, administrative documents contained no dating at all, implying that administration there may have been manageable even without the ability to securely order larger numbers of disbursements or receipts in annual cycles (Eidem 1992, 35). A similar lack of dating formulas is evident in the majority of administrative *šakkanakku*-texts from Tuttul (Krebernik 2001, 190-194). At Alalah, as already mentioned, year names could be omitted, while dating by month was maintained in order to temporally serialise disbursements of grain. Another ordering device was the compilation, distillation, and abstraction of individual records into compound accounts, more fittingly referred to as *Sammeltafeln* in German (Zeeb 2001, 157, see for an intriguing case-study van de Mieroop 2000). Such texts contained a summary of repeated transactions over prolonged periods of time, e.g. all grains received for beer production over a nine-month period (L91-206, cf. van de Mieroop 1994, 339-341), or the total number of commodities sent as gifts to neighbouring lords (OBTCB 87, cf. Talon 1997, 100-102). Standardised formats of this sort are extremely rare in the present dataset, but appear regularly in e.g. Middle Assyrian estate accounting (see for example annual series on grain yields from Dūr-Katlimmu and on sheep and goat herds from Tall Ali, respectively Röllig 2008, 19-28, and Ismail and Postgate 2008, a good discussion of the process and consequences of increasing levels of abstracted information in this type of accounts is given by Cancik-Kirschbaum 2016).

21.1.1 The Jazīrah and the Middle Euphrates

Let us look at the calendars underpinning these dating procedures. Means of measuring time in the Ancient Near East abided by agricultural and religious cycles, and thus depended on the seasons and the movement of the sun and the moon. All calendars employed twelve lunar months, generally with a length of 30 days each (cf. 10.1.1), and correlated for the disagreement with the solar year by the occasional insertion of intercalary months (Pruzsinszky 2009, 103, on Ancient Near Eastern calendars and chronology in general, see also Cohen 2015). The calendars employed across the Middle Bronze Age Jazīrah and in the Middle Euphrates Valley are fairly well understood, and the following merely outlines the sequences of months and the synchronisation of the two principal calendars employed within the present dataset. We will subsequently consider a third calendar in use at Alalah, which derives from a somewhat different tradition. Dating of administrative texts is absent in the assemblage from Šušarrā (Eidem 1992, 35), and all chronological patterns must here be established through contextual information.

Two principal calendars were used in the Jazīrah and the Middle Euphrates (for the principal study, see Charpin 1985, augmented by van de Mieroop 1994, 306-310, Lacambre and Millet Albà 2008c, 155-156, summarised in Charpin and Ziegler 2003, 155-156). One is closely associated with Mari, and is attested through the reigns of Yahdun-Lim, Sumu-Yaman, and Zimri-Lim. This calendar is in turn closely related to menologies from the alluvial plain. Another is known primarily from sites associated with the reign of Šamšī-Adad (1808-1775 BCE), and therefore commonly referred to as the 'Šamšī-Adad calendar'. Despite the name, the exact connection between dating institution and political organisation implied is not entirely clear. Though attested at Ašnakkum, Šubat-Enlil, Qaṭṭarā, and Tuttul, only scarce pieces of evidence are able to inform us as to whether the Šamšī-Adad calendar was politically instigated or part of a wider diffused network (Charpin and Ziegler 2003, 155-156). Apart from Aššur, where a long-lived local menology was in use, no textual sources from the Jazīrah pre-date the arrival of Šamšī-Adad onto the political stage in the region, and so we are left to guess as to the character of local calendars in the dry-farming plains prior to the beginning of the 18th century BCE. What is interesting is that the menology remained in widespread use in this area long time after the fall of the Kingdom of Northern Mesopotamia in 1775 BCE. Both the Mari and the Šamšī-Adad calendar are lunar calendars comprising twelve months of 30 days each. They differ mainly in the relation of their annual cycle with the tropical year, as illustrated in the table below. While the Mari calendar started at spring equinox, a trait common to calendars also in the alluvial plain, the Šamšī-Adad calendar was an autumn calendar (Table 20.108).

No.	Mari Calendar	Gregorian	Spring Equinox	
I	*Urāhum*	Mar/Apr		
II	*Malkānum*	Apr/May		
III	*Lahhum*	May/Jun		
IV	*Abum*	Jun/Jul		
V	*Hibirtum*	Jul/Aug	**Šamšī-Adad Calendar**	**No.**
VI	^{d}igi-kur	Aug/Sep	*Niqmum*	I*
VII	*Kinūnum*	Sep/Oct	*Kinūnum*	II*
VIII	*Dagan*	Oct/Nov	*Tamhīrum*	III*
IX	*Lîliātum*	Nov/Dec	*Nabrûm*	IV*
X	*Bēlet-bīri*	Dec/Jan	*Mammītum*	V*
XI	*Kiskissum*	Jan/Feb	*Mana*	VI*
XII	*Ebūrum*	Feb/Mar	*Ayyarum*	VII*
		Mar/Apr	*Niggallum* (še-kin-ku5)	VIII*
		Apr/May	*Maqrānum*	IX*
		May/Jun	^{d}Dumu-zi	X*
		Jun/Jul	*Abum*	XI*
	Autumn year	Jul/Aug	*Tīrum*	XII*

Table 21.108: Months and concordance between the Mari Calendar and the Šamšī-Adad Calendar

21.1.2 Alalah

Other menologies were employed at Alalah, which only became more closely associated with standard calendars from further east in the Late Bronze Age (Cohen 1993, 302). The calendar employed in the 17th century BCE appears to be of a relatively local origin, as discussed in great detail by Zeeb in his analysis of the Level VII grain disbursement records (Zeeb 2001, 158-183). In his reconstruction, Zeeb offers a chronological ordering of 27 monthly records spanning three different years, which in turn allows us to approximate the general structure of the Alalah calendar. According to this analysis, the calendar year started in July, including twelve months as given in the following table (Table 20.109).

No.	Alalah Calendar	Gregorian
I	*Attana*	July
II	*Aštabi*	Aug
III	*Niqali*	Sep
IV	*Pagri*	Oct
V	*Kalma*	Nov
VI	*Utithe*	Dec
VII	*Bala'e*	Jan
VIII	*Šatalli*	Feb
IX	*Hudizzi*	Mar
X	*Hiari*	Apr
XI	*Ekena*	May
XII	*Kirari*	Jun

Table 21.109: Months in the Alalah calendar

Appendix 4: Database

A copy of the basic datatables and the core queries used in their analysis has been attached to this thesis on a USB stick, in a Microsoft Access-format. A concise outline of the data structure and its use in the present study was given in Chapter 4. The archaeological context of individual assemblages of cuneiform texts found in this database is described in Appendix 1. Details of metrological and chronological ordering pertaining to the Middle Bronze Age in general and the geographical area and historical period under consideration in particular were given in Appendices 2 and 3 respectively.

Here, I briefly summaries the various file groups contained in the database. Groups labelled 0 through 5 and “Miscellanous Other” are standard elements of the FCP data structure, and has been maintained here for convenience. The only one of these groups that should concern us here is the group labelled “1 Main Tables”, which contains the main datatables derived from analysis of textual assemblages. These are, in order of appearance, T_Connections, T_Datasets, T_MajorIDs, and T_Observations (T_Periods, while maintained from the original data structure, will not concern us here). The last table, T_Observations, contains substantive data from all four levels of the data structure (cf. 5.2.1 and 5.2.2), and can be searched according to Major ID of the individual observation, or according to the text as given in the primary publication (Detail Data Source). T_MajorID contains all observation codes and their relational links. T_Connections, contains the hierarchical data of individual IDs, and serves to filter IDs according to queries within specific data levels. T_Datasets contains core information on the first level dataset code (e.g. ASZ). The T_Observations table is, by far, the most voluminous, and includes more than 50,000 individual lines of observations with associated quantitative information (cf. 5.2.8).

The group labelled Glossaries provides an overview of the type of data contained in T_Observations, in that the former contains indices on all Detail Data Type labels contained in the dataset. These are ordered according to their parent Data Type, a relationship briefly described in 5.2.6 along with a concise introduction to their definition and use.

The five groups starting with WRIT_ALL_Q contain queries on text metadata drawn from T_Observations. These relate for example to genre types (ALL_Q_Genre), preservation assessment (ALL_Q_Presernvation), archaeological context (ALL_Q_ExternalID), dating (ALL_Q_Dating), and analytical groups (ALL_Q_CuneiformGroups).

Data analyses have focused overwhelmingly on information contained in third and fourth level MajorIDs (as noted in 5.2.7), specifically on the circulation of resources and their recipients. The two query groups ALL_Allotment and ALL_Resources contain queries designed to filter and order types of information necessary to identify under any one third-evel MajorID the entity, human, animal, a field, or a temple structure, in receipt of a given amount of resources (ALL_Allotment), second the subordinated fourth-level MajorID and the type and amount of the resource in question (ALL_Resource). ALL_Persons gathers information relating to human individuals appearing under any one MajorID. The query ALL_Entries&Resource_SEARCH found at the bottom of database overview pane gives an example of the tables generated from a search drawing together these queries.

The six groups labelled with study site codes contains indices for individual analyses. Under the individual dataset query groups (ALA, TUT, ASZ, SZE, QAT, SZU) can be found indices for all texts included in the dataset (e.g. WRIT_ASZ_Reference), and master queries for individual analytical groups used in the present study (e.g. WRIT_ASZ_(Dossier)_001, cf. also 5.2.6). When linking the index query of a given analytical group with searches conducted using ALL_Entries&Resource_SEARCH mentioned above, the resulting table will produce data drawn only from that specific group of texts, rather than the entire dataset. The last group, WRIT_SEARCH, contains queries that can be used to freely search individual observations in the entire dataset.

Bibliography

ABBO, S., D. SHTIENBERG, J. LICHTENZVEIG, S. LEV-YADUN & A. GOPHER 2003. The Chickpea, Summer Cropping, and a New Model for Pulse Domestication in the Ancient Near East. *The Quarterly Review of Biology,* 78**,** 435-448.

ABRAHAMI, P. 2011. Masculine and Feminine Personal Determinatives before Women's Names at Nuzi: A Gender Indicator of Social or Economic Independence? *Cuneiform Digital Library Bulletin,* 2011.

ABRAMS, P. 1988. Notes on the Difficulty of Studying the State. *Journal of Historical Sociology,* 1**,** 58-89.

ACHILLI, A., A. OLIVIERI, P. SOARES, H. LANCIONI, B. H. KASHANI, U. A. PEREGO, S. G. NERGADZE, V. CAROSSA, M. SANTAGOSTINO, S. CAPOMACCIO, M. FELICETTI, W. AL-ACHKAR, M. C. T. PENEDO, A. VERINI-SUPPLIZI, M. HOUSHMAND, S. R. WOODWARD, O. SEMINO, M. SILVESTRELLI, E. GIULOTTO, L. PEREIRA, H.-J. BANDELT & A. TORRONI 2012. Mitochondrial genomes from modern horses reveal the major haplogroups that underwent domestication. *Proceedings of the National Academy of Sciences,* 109**,** 2449-2454.

ADAMS, R. M. 1965. *Land Behind Baghdad,* Chicago, IL, University of Chicago Press.

--- 1975. An Ancient Uruk Threshing Sledge or Harrow? *Sumer,* 31**,** 17-20.

--- 1981. *Heartland of Cities,* Chicago, IL, University of Chicago Press.

ADAMS, R. M. & H. J. NISSEN 1972. *The Uruk Countryside. The Natural Setting of Urban Societies,* Chicago & London, University of Chicago Press.

ADEOTI, J. S. 1993. The potential and development in animal transport devices. *In:* LAWRENCE, P. R., LAWRENCE, K., DIJKMAN, J. T. & STARKEY, P. H. (eds.) *Research for Development of Animal Traction in West Africa - Recherche pour le développement de la traction animale en Afrique de l'Ouest.* Addis Ababa: International Livestock Centre for Africa (ILCA),

AHMED, K. M. 2012. *The Beginnings of Ancient Kurdistan (c. 2500-1500 BC): A Historical and Cultural Synthesis.* Ph.D., University of Leiden.

AKKERMANS, P. M. M. G., F. ISMAIL, L. SENIOR, M. VAN DE MIEROOP & H. WEISS 1991. An Administrative Building of the King of Andarig at Šubat-Enlil. *N.A.B.U. Nouvelles Assyriologiques Brèves et Utilitaires,* 1991**,** 68-70.

AKKERMANS, P. M. M. G. & G. M. SCHWARTZ 2003. *The Archaeology of Syria: from Complex Hunter-Gatherers to Early Urban Societies (c. 16,000-300 BC),* Cambridge, Cambridge University Press.

AL-HAIK, A. R. 1968. *Key Lists of Archaeological Excavations in Iraq 1842-1965,* Coconut Grove, FL, Field Research Projects.

AL-SOOF, B. A. 1964. Uruk Pottery from the Dokan and Shahrazur Districts. *Sumer,* 20**,** 37-44.

--- 1968. Distribution of Uruk, Jamdat Nasr and Ninevite V Pottery as Revealed by Field Survey Work in Iraq. *Iraq,* 30**,** 74-86.

--- 1970. Mounds in the Rania Plain and excavations at Tell Bazmusian (1956). *Sumer,* 26**,** 65-104.

AL-TIKRITI, A. A.-Q. 1960. Excavations at Tell ed-Deim. *Sumer,* 16**,** 93-107.

ALBARELLA, U., K. DOBNEY & P. ROWLEY-CONWY 2006. The domestication of the pig (Sus scrofa): new challenges and approaches. *In:* ZEDER, M. A., BRADLEY, D. G., EMSHWILLER, E. & SMITH, B. D. (eds.) *Documenting domestication: new genetic and archaeological paradigms.* Berkeley, CA: University of California Press, 209-227.

ALBARELLA, U., F. MANCONI & A. TRENTACOSTE 2011. A week on the plateau: Pig husbandry, mobility and resource exploitation in central Sardinia. *In:* ALBARELLA, U. & TRENTACOSTE, A. (eds.) *Ethnozooarchaeology: The Present and Past of Human-Animal Relationships.* Oxford and Oakville: Oxbow Books, 143-159.

ALBARELLA, U., F. MANCONI, J.-D. VIGNE & P. ROWLEY-CONWY 2007. Ethnoarchaeology of pig husbandry in Sardinia and Corsica. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 285-307.

ALBERTI, M. E., E. ASCALONE & L. PEYRONEL (eds.) 2007. *Weights in Context: Bronze Age Weighing Systems of Eastern Mediterranean: Chronology, Typology, Material and Archaeological Contexts,* Rome: Istituto Italiano di Numismatica.

ALGAZE, G. 2005. *The Uruk World System: The Dynamics of Expansion of Early Mesopotamian Civilization. Second Edition,* Chicago, IL, University of Chicago Press.

ALTAWEEL, M. 2008. *The Imperial Landscape of Ashur: Settlement and Land Use in the Assyrian Heartland,* Heidelberg, Heidelberger Orientverlag.

ALTAWEEL, M., A. MARSH, S. MÜHL, O. NIEUWENHUYSE, K. RADNER, K. RASHEED & S. A. SABER 2012. New Investigations in the Environment, History, and Archaeology of the Iraqi Hilly Flanks: Shahrizor Survey Project 2009-2011. *Iraq,* 74**,** 1-35.

ANANE, R. 2001. Data Mining and Serial Documents. *Computers and the Humanities,* 35**,** 299-314.

ANBAR, M. 1991. *Les tribus amurrites de Mari,* Freiburg & Göttingen, Universitätsverlag/Vandenhoeck & Ruprecht.

ANDERSON, P. C. 2014a. Fodder and Straw in Tunisia and Syria: Modern and Archaeological Contexts. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 210-214.

--- 2014b. Working with the Ard in Present-day Tunisia. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 32-35.

ANDERSON, P. C., J.-M. GEORGES, R. VARGIOLU & H. ZAHOUANI 2006. Insights from a tribological analysis of the tribulum. *Journal of Archaeological Science,* 33**,** 1559-1568.

ANDERSON, P. C. & M.-L. INIZAN 1994. Utilisation du tribulum au début du IIIe millénaire: Des lames «cananéennes» lustrées a Kutan (Ninive V) dans la région de Mossoul, Iraq. *Paléorient*, 85-103.

ANDERSON, P. C. & F. SIGAUT 2014. Reasons for Variability in Harvesting Techniques and Tools. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 85-92.

ANDERSON, P. C. & J. WHITTAKER 2014a. Blades, Sickles, Threshing Sledges and Experimental Archaeology in Northern Mesopotamia. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 161-168.

--- 2014b. Experiments with Harvesting Techniques: Neolithic Sickles and Uprooting. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 106-108.

ANDRÉN, A. 1998. *Between Artifacts and Texts: Historical Archaeology in Global Perspective,* New York, Plenum Press.

ANSCHUETZ, K. F., R. H. WILSHUSEN & C. L. SCHEICK 2001. An Archaeology of Landscapes: Perspectives and Directions. *Journal of Archaeological Research,* 9, 157-211.

ARBUCKLE, B. S. 2012. Animals in the Ancient World. *In:* POTTS, D. T. (ed.) *A Companion to the Archaeology of the Ancient Near East.* Oxford: Blackwell, 201-219.

ARCHI, A. 1986. The Archives of Ebla. *In:* VEENHOF, K. R. (ed.) *Cuneiform Archives and Libraries. Papers Read at the 30e Rencontre Assyriologique Internationale, Leiden 4-8 July 1983.* Leiden: Nederlands Instituut voor het Nabije Oosten, 72-86.

--- 1991. Culture de l'olivier et production de l'huile à Ebla. *In:* CHARPIN, D. & JOANNÈS, F. (eds.) *Marchands, Diplomates et Empereurs: Études sur la civilisation mésopotamienne offertes à Paul Garelli.* Paris: ERC, 211-222.

ARKHIPOV, I. 2014. Toponymie et idéologie à l'époque amorrite: Les cas de Šubat-Šamaš et Ṣubat-Eštar. *In:* ZIEGLER, N. & CANCIK-KIRSCHBAUM, E. (eds.) *Entre les Fleuves - II: D'Assur à Mari et au-delà.* Gladbeck: PeWe-Verlag, 267-272.

ASDRAKHAS, S. 1988. *Elliniki koinonia kai oikonomia 18 kai 19 ai,* Athens, Ermis.

ASHMORE, W. 2004. Social Archaeologies of Landscape. *In:* MESKELL, L. & PREUCEL, R. W. (eds.) *A Companion to Social Archaeology.* Blackwell: Oxford, 255-271.

ASHMORE, W. & A. B. KNAPP (eds.) 1999. *Archaeologies of Landscape: Contemporary Perspectives,* Malden, Mass.: Blackwell.

ASTON, M. 1985. *Interpreting the Landscape: Landscape Archaeology and Local History,* London and New York, Routledge.

ASTOUR, M. C. 1995. Overland Trade Routes in Ancient Western Asia. *In:* SASSON, J. M. (ed.) *Civilizations of the Ancient Near East.* New York, NY: Scribner, 1401-1420.

AVILOVA, L. I. 2012. On the Characteristic of Temple Complexes in the Near East in the 4th - 3rd Millennia BC. *Asian Culture and History,* 4**,** 3-15.

BACHHUBER, C. 2013. Sumer, Akkad, Ebla and Anatolia. *In:* CRAWFORD, H. (ed.) *The Sumerian World.* London & New York: Routledge, 498-516.

BAILEY, A. M. & J. R. LLOBERA 1981. The AMP: Sources and Formation of the Concept. *In:* BAILEY, A. M. & LLOBERA, J. R. (eds.) *The Asiatic Mode of Production. Science and Politics.* London: Routledge & Kegan Paul, 13-48.

BALKAN, K. 1979. *Makriš* and *Ašiš*, Component-Parts of Wagons and Ploughs Respectively in a Cappadocian Tablet from Kültepe. *In:* AKURGAL, E. (ed.) *Florilegium Anatolicum. Mélanges offerts à Emmanuel Laroche.* Paris: Boccard, 49-58.

BAR-MATTHEWS, M. & A. AYALON 2011. Mid-Holocene climate variations revealed by high-resolution speleothem records from Soreq Cave, Israel and their correlation with cultural changes. *The Holocene,* 21**,** 163-171.

BAR-MATTHEWS, M., A. AYALON & A. KAUFMAN 1997. Late Quaternary Paleoclimate in the Eastern Mediterranean Region from Stable Isotope Analysis of Speleothems at Soreq Cave, Israel. *Quaternary Research,* 47**,** 155-168.

BAR-MATTHEWS, M., A. AYALON, A. KAUFMAN & G. J. WASSERBURG 1999. The Eastern Mediterranean paleoclimate as a reflection of regional events: Soreq cave, Israel. *Earth and Planetary Science Letters,* 166**,** 85-95.

BARJAMOVIC, G. 2013. Mesopotamian Empires. *In:* SCHEIDEL, W. & BANG, P. F. (eds.) *The Oxford Handbook of the State in the Ancient Near East and Mediterranean.* Oxford & New York: Oxford University Press, 120-160.

BARJAMOVIC, G., T. HERTEL & M. T. LARSEN 2012. *Ups and Downs at Kanesh: chronology, history and society in the Old Assyrian period,* Leiden, Nederlands Instituut voor het Nabije Oosten.

BARTH, F. 1961. *Nomads of South Persia,* London, Oslo University Press and George Allen & Unwin.

BATIUK, S. & A. A. BURKE 2005. The Tell Atchana Mapping and GIS Project. *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 145-152.

BATIUK, S. & M. HOROWITZ 2010. Temple Deep Sounding Investigations 2001-2006. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 161-175.

BATTINI, L. 2001. La Dernière Phase du Palais de Tell al-Rimah: Nouvelle Approche. *Revue d'assyriologie et d'archéologie orientale,* 95**,** 115-140.

BEAUMONT, P., G. H. BLAKE & J. M. WAGSTAFF 1976. *The Middle East: A Geographical Study,* London, John Wiley.

BECKER, C. 2005. Small numbers, large potential - New prehistoric finds of elephant and beaver from the Khabur river/Syria. *Munibe,* 57**,** 445-456.

--- 2008. Die Tierknochenfunde aus Tall Šeh Hamad/Dur-Katlimmu: eine zoogeographischhaustierkundliche Studie. *In:* KÜHNE, H. (ed.) *Umwelt und Subsistenz der Assyrischen Stadt Dur-Katlimmu am Unterent Habur.* Wiesbaden: Harrassowitz, 61-132.

BEDIGIAN, D. 1985. Is še-giš-ì Sesame or Flax? *Bulletin of Sumerian Agriculture,* 2**,** 159-178.

--- 1999. Sesame. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 411-419.

--- 2010. Introduction: History of the Cultivation and Use of Sesame. *In:* BEDIGIAN, D. (ed.) *Sesame: The genus Sesamum.* Boca Raton, FL: CRC Press, 1-32.

BEJA-PEREIRA, A., D. CARAMELLI, C. LALUEZA-FOX, C. VERNESI, N. FERRAND, A. CASOLI, F. GOYACHE, L. J. ROYO, S. CONTI, M. LARI, A. MARTINI, L. OURAGH, A. MAGID, A. ATASH, A. ZSOLNAI, P. BOSCATO, C. TRIANTAPHYLIDIS, K. PLOUMI, L. SINEO, F. MALLEGNI, P. TABERLET, G. ERHARDT, L. SAMPIETRO, J. BERTRANPETIT, G. BARBUJANI, G. LUIKART & G. BERTORELLE 2006. The origin of European cattle: Evidence from modern and ancient DNA. *Proceedings of the National Academy of Sciences,* 103**,** 8113-8118.

BENATI, G. 2015. On Reconstructing Past Economies and Lifeways: A View from the Ancient Near East. *Ocnus,* 23**,** 199-205.

BESANÇON, J., L. COPELAND, F. HOURS, S. MUHESEN & P. SANLAVILLE 1980. Géomorphologie et préhistoire de la vallée moyenne de l'Euphrate. Essai de chronologie du Pleistocene et du Paléolithique de Syrie. *Comptes Rendus de l'Academie des Sciences D,* 290.

BIELIŃSKI, P. 2000. Tell Arbid. The fourth season. *Polish Archaeology in the Mediterranean,* 11**,** 273-284.

BIETAK, M. & E. CZERNY (eds.) 2007. *The Synchronisation of Civilisations in the Eastern Mediterranean in the Second Millenium B.C. III,* Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

BIGA, M. G. 2014. Some Aspects of the Wool Economy at Eba (Syria, 24th Century BC). *In:* BRENIQUET, C. & MICHEL, C. (eds.) *Wool Economy in the Ancient Near East and the Aegean: From the Beginnings of Sheep Husbandry to Institutional Textile Industry.* Oxford: Oxbow, 139-150.

BINTLIFF, J. (ed.) 1991. *The Annales School and Archaeology,* London & New York: Leicester University Press.

BIROT, M. 1973. Nouvelles découvertes épigraphiques au Palais de Mari (salle 115). *Syria,* 50**,** 1-12.

--- 1993. *Correspondance des Gouverneurs de Qaṭṭunân,* Paris, ERC.

BLANTON, R. & L. FARGHER 2008. *Collective Action in the Formation of Pre-Modern States*, University of Florida Press.

BLANTON, R. E. 2011. Cultural Transformation, Art, and Collective Action in Polity Building. *Cross-Cultural Research,* 20**,** 1-22.

BLOCH, G., T. M. FRANCOY, I. WACHTEL, N. PANITZ-COHEN, S. FUCHS & A. MAZAR 2010. Industrial apiculture in the Jordan valley during Biblical times with Anatolian honeybees. *Proceedings of the National Academy of Sciences,* 107**,** 11240-11244.

BLUNT, L. A. 1968 [1879]. *Bedouin Tribes of the Euphrates. Edited, with a Preface and some Account of the Arabs and their Horses by W.S. Blunt,* London, Frank Cass & Co.

BOROWSKI, O. 1998. *Every Living Thing: Daily Use of Animals in Ancient Israel,* Walnut Creek, CA, Altamira Press.

BÖSZE, I. 2010. Halbierten sich die Gersterationen in der mittelassyrischen Zeit? Ein Beitrag zu den mittelassyrischen Volumeneinheiten. *In:* BECKER, J., HEMPELMANN, R. & REHM, E. (eds.) *Kulturlandschaft Syrien. Zentrum und Peripherie. Festschrift für Jan-Waalke Meyer.* Münster: Harrassowitz, 37-51.

BOTTEMA, S. & R. T. J. CAPPERS 2000. Palynological and Archaeobotanical Evidence from Bronze Age Northern Mesopotamia. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia.* Leiden: Nederlands Instituut voor het Nabije Oosten, 37-70.

BOTTEMA, S. & W. VAN ZEIST 1981. Palynological evidence for the climatic history of the Near East, 50,000-6,000 BP. *Préhistoire du Levant,* 598**,** 111-132.

BOTTÉRO, J. 2004. *The Oldest Cuisine in the World: Cooking in Mesopotamia,* Chicago, IL, University of Chicago Press.

BRADBURY, J., D. DAVIES, M. JAY, G. PHILIP, C. ROBERTS & C. SCARRE 2015. Making the Dead Visible: Problems and Solutions for "Big" Picture Approaches to the Past, and Dealing with Large "Mortuary" Datasets. *Journal of Archaeological Method and Theory,* 22**,** 561-591.

BRADLEY, D. G. & D. A. MAGEE 2006. Genetics and the Origins of Domestic Cattle. *In:* ZEDER, M. A. (ed.) *Documenting Domestication: New Genetic and Archaeological Paradigms.* Berkeley, CA: University of California Press, 317-328.

BRAIDWOOD, R. J. 1937. *Mounds in the Plain of Antioch: An Archaeological Survey,* Chicago, IL, University of Chicago Press.

BRAIDWOOD, R. J. & L. S. BRAIDWOOD 1960. *Excavations in the Plain of Antioch I: The Earlier Assemblages Phases A-J,* Chicago, IL, University of Chicago Press.

BRECKWOLDT, T. 1996. Management of Grain Storage in Old Babylonian Larsa. *Archiv für Orientforschung,* 42/43**,** 64-88.

BRIDGLAND, D. R., R. WESTAWAY, M. ABOU ROMIEH, I. CANDY, M. DAOUD, T. DEMIR, N. GALIATSATOS, D. C. SCHREVE, A. SEYREK, A. D. SHAW, T. S. WHITE & J. WHITTAKER 2012. The River Orontes in Syria and Turkey: Downstream variation of fluvial archives in different crustal blocks. *Geomorphology,* 165-166**,** 25-49.

BRINKMAN, J. A. 1964. Appendix: Mesopotamian Chronology of the Historical Period. *In:* OPPENHEIM, A. L. (ed.) *Ancient Mesopotamia: Portrait of a Dead Civilization.* Chicago & London: University of Chicago Press, 335-352.

--- 2007. Masculine or Feminine? The Case of Conflicting Gender Determinatives for Middle Babylonian Personal Names. *In:* ROTH, M. T., FARBER, W., STOLPER, M. W. & VON BECHTOLSHEIM, P. (eds.) *Studies Presented to Robert D. Biggs.* Chicago, IL: Oriental Institute of the University of Chicago, 1-10.

BROMLEY, D. W. 1992. The Commons, Property, and Common-Property Regimes. *In:* BROMLEY, D. W. (ed.) *Making the Commons Work. Theory, Practice, and Policy.* San Francisco, CA: ICS Press, 3-16.

BRONK RAMSEY, C., M. W. DEE, J. M. ROWLAND, T. F. G. HIGHAM, S. A. HARRIS, F. BROCK, A. QUILES, E. M. WILD, E. S. MARCUS & A. J. SHORLAND 2010. Radiocarbon-Based Chronology for Dynastic Egypt. *Science,* 328.

BROSIUS, M. (ed.) 2003. *Ancient Archives and Archival traditions: Concepts of Record-Keeping in the Ancient World,* Oxford & New York: Oxford University Press.

BROWN, B. 2013. The structure and decline of the Middle Assyrian State: the role of autonomous and nonstate actors. *Journal of Cuneiform Studies,* 65**,** 97-126.

BRUFORD, M. W. & S. J. TOWNSEND 2006. Mitochondrial DNA Diversity in Modern Sheep. *In:* ZEDER, M. A. (ed.) *Documenting Domestication: New Genetic and Archaeological Paradigms.* Berkeley, CA: University of California Press, 306-316.

BRUNKE, H. 2011a. *Essen in Sumer: Metrologie, Herstellung und Terminologie nach Zeugnis der Ur III-zeitlichen Wirtschaftsurkunden,* Munich, Herbert Utz Verlag.

--- 2011b. Zur Rekonstruktion von Speisen in Sumer anhand Administrativer Urkunden. *In:* SELZ, G. J. & WAGENSONNER, K. (eds.) *The Empirical Dimension of Ancient Near Eastern Studies - Die empirische Dimension altorientalischer Forschungen.* Vienna: LIT Verlag, 375-402.

BRY, P. 2005. *Des Regles Administrativs et Techniques a Mari,* Barcelona, Editorial AUSA.

BRYCE, T. 2009. *The Routledge Handbook of the Peoples and Places of Ancient Western Asia,* London & New York, Routledge.

BÜCHER, K. 1979 [1906]. Die Entstehung der Volkswirtschaft. *In:* FINLEY, M. I. (ed.) *The Bücher-Meyer Controversy.* New York, NY: Arno Press,

BURGUIÈRE, A. 2009. *The Annales School. An Intellectual History,* Ithaca, NY, Cornell University Press.

BURKE, M. L. 1963. *Textes Administratifs de la Salle 111 du Palais,* Paris, Paul Geuthner.

BURKE, P. 1990. *The French Historical Revolution: The Annales School 1929-89,* Stanford, Stanford University Press.

--- 2005. *History and Social Theory. 2nd edition,* Cambridge, Polity Press.

BUTZ, K. 1979. Ur in Altbabylonischer Zeit als Wirtschaftsfaktor. *In:* LIPINSKI, E. (ed.) *State and Temple Economy in the Ancient Near East.* Leuven: Department Orientalistiek, 257-408.

ÇAKIRLAR, C. & S. ROSSEL 2010. Faunal Remains from the 2003-2004 Excavations at Tell Atchana. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 141-146.

CAMIC, C., P. S. GORSKI & D. M. TRUBEK (eds.) 2005. *Max Weber's Economy and Society. A Critical Companion,* Stanford, CA: Stanford University Press.

CAMPBELL, B. M. S. 2000. *English Seigniorial Agriculture, 1250-1450,* Cambridge, Cambridge University Press.

CANCIK-KIRSCHBAUM, E. 2014. From Text to Tell: Governance and the Geography of Political Space according to Middle Assyrian Administrative Documents. *In:* BONATZ, D. (ed.) *The Archaeology of Political Spaces. The Upper Mesopotamian Piedmont in the Second Millennium BC.* Berlin & Boston, MA: De Gruyter, 107-116.

--- 2016. Überlegungen zur Systematik Administrativen Schriftgut der Mittelassyrischen Zeit in Dūr-Katlimmu. *In:* KÜHNE, H. (ed.) *Dur-Katlimmu in mittelassyrischer Zeit: Die Ausgrabungen am Westhang der Zitadelle von Tall Seh Hamad 1978-1984.* Wiesbaden: Harrassowitz,

CANCIK-KIRSCHBAUM, E., N. BRISCH & J. EIDEM (eds.) 2014. *Constituent, Confederate, and Conquered Space: The Emergence of the Mitanni State,* Berlin: De Gruyter.

CANTRELL, P. A. 1999. Beer and Ale. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 619-625.

CARBALLO, D. M., P. ROSCOE & G. M. FEINMAN 2014. Cooperation and Collective Action in the Cultural Evolution of Complex Societies. *Journal of Archaeological Method and Theory,* 21**,** 98-133.

CARNEIRO, R. L. 1970. A Theory of the Origin of the State. *Science,* 169**,** 733-738.

CARR, E. H. 2001. *What is History?,* London, Palgrave Macmillan.

CASANA, J. 2003. *From Alalakh to Antioch.* Ph.D., University of Chicago.

--- 2008. Mediterranean valleys revisited: Linking soil erosion, land use and climate variability in the Northern Levant. *Geomorphology,* 101**,** 429-442.

--- 2009. Alalakh and the Archaeological Landscape of Mukish: The Political Geography and Population of a Late Bronze Age Kingdom. *Bulletin of the American Schools of Oriental Research,* 353**,** 7-37.

--- 2012. Settlement, Territory, and the Political Landscape of the Late Bronze Age Polities in the Northern Levant. *Archeological Papers of the American Anthropological Association,* 22**,** 107-125.

--- 2013. Radial route systems and agro-pastoral strategies in the Fertile Crescent: New discoveries from western Syria and southwestern Iran. *Journal of Anthropological Archaeology,* 32**,** 257-273.

--- 2014. Regional-Scale Archaeological Remote Sensing in the Age of Big Data. *Advances in Archaeological Practice,* 3**,** 222-233.

CASANA, J. & A. R. GANSELL 2005. Surface Ceramics, Off-Site Survey, and Floodplain Development at Tell Atchana (Alalakh). *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 153-170.

CASANA, J. & T. J. WILKINSON 2005a. Appendix A: Gazetteer of Sites. *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 203-280.

--- 2005b. Settlement and Landscapes in the Amuq Region. *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 25-66.

CAUBET, A. & F. POPLIN 2010. Réflexions sur la question de l'eléphant syrien. *In:* KÜHNE, H. (ed.) *Dūr-Katlimmu 2008 and Beyond.* Wiesbaden: Harrassowitz, 1-10.

CAVIGNEAUX, A. 2006. Les suidés: pictogrammes et listes lexicales. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 15-24.

CAVIGNEAUX, A. & L. C. D'ISTRIA 2009. Les découvertes épigraphiques des fouilles récentes de Mari. État des recherches en janvier 2009. *Studia Orontica,* 6**,** 51-68.

CAVIGNEAUX, A. & B. K. ISMAIL 1990. Die Statthalter von Suḫu und Mari im 8. Jh. v. Chr. *Baghdader Mitteilungen,* 21.

CHAMBON, G. 2009a. *Les Archives du Vin à Mari,* Paris, SEPOA.

--- 2009b. *Normes et pratiques: L'homme, la mesure et l'écriture en Mésopotamie,* Berlin, PeWe-Verlag.

CHAPMAN, J. & J. LASZLOVSZKY 2010. Introduction to the Upper Tisza Project. *In:* CHAPMAN, J., GILLINGS, M., MAGYARI, E., SHIEL, R., GAYDARSKA, B. & BOND, C. (eds.) *The Upper Tisza Project Book 2: Settlement Patterns in the Bodrogköz Block.* Oxford: Archaeopress, 1-27.

CHAPMAN, J., R. SHIEL & Š. BATOVIĆ 1996. *The Changing Face of Dalmatia: Archaeological and Ecological Studies in a Mediterranean Landscape,* London, Leicester University Press.

CHARLES, M. P. 1984. Introductory Remarks on the Cereals. *Bulletion of Sumerian Agriculture,* 1**,** 17-31.

--- 1985. An Introduction to the Legumes and Oil Plants of Mesopotamia. *Bulletin of Sumerian Agriculture,* 2**,** 39-61.

--- 1987. Onions, Cucumbers and the Date Palm. *Bulletin of Sumerian Agriculture,* 3**,** 1-21.

--- 1993. The 6G Ash-Tip and its contents: Cultic and administrative discard from the temple? Botanical Remains. *In:* GREEN, A. (ed.) *Abu Salabikh Excavations Vol. 4.* London: British School of Archaeology in Iraq, 203-207.

CHARPIN, D. 1985. Les archives d'époque "assyrienne" dans le palais de Mari. *MARI,* 4**,** 243-268.

--- 1986. *Le clergé d'Ur au siècle d'Hammurabi : (XIXe-XVIIIe siècles av. J.-C.),* Genève, Librairie Droz.

--- 1987. Le rôle économique du palais en Babylonie sous Hammurabi et ses successeurs. *In:* LÉVY, E. (ed.) *Le systéme palatial en Orient, en Grèce et à Rome.* Leiden: Brill, 111-126.

--- 1990a. Conclusions et Perspectives: Tell Mohammed Diyab, une ville du pays d'Apum. *In:* DURAND, J.-M. (ed.) *Tell Mohammed Diyab, Campagnes 1987 et 1988.* Paris, 117-122.

--- 1990b. A Contribution to the Geography and History of the Kingdom of Kahat. *In:* EICHLER, S. & WÄFLER, M. (eds.) *Tall al-Ḥamīdīya 2.* Göttingen: Vandenhoeck & Ruprecht, 67-86.

--- 1993. Données Nouvelles sur la Poliocétique à l'Époque Paléo-Babylonienne. *MARI,* 7**,** 193-203.

--- 2001. L'archivage des tablettes dans le palais de Mari: nouvelles données. *In:* VAN SOLDT, W. H. (ed.) *Veenhof Anniversary Volume.* Leiden: Nederlands Instituut van het Nabije Oosten, 13-30.

--- 2002. La Politique Hydraulique des Rois Paleó-Babyloniens. *Annales. Histoire, Sciences Sociales,* 57**,** 545-559.

--- 2004. Histoire politique du Proche-Orient amorrite (2002-1595). *In:* WÄFLER, M. (ed.) *Mesopotamien: die altbabylonische Zeit.* Freiburg/Göttingen: Vandenhoek & Ruprecht, 25-480.

--- 2009. Un itinéraire paléo-babylonien le long du Habur. *In:* CANCIK-KIRSCHBAUM, E. & ZIEGLER, N. (eds.) *Entre les fleuves - I: Untersuchungen zur historischen Geographie Obermesopotamiens im 2. Jahrtausend v. Chr.* Gladbeck: PeWe-Verlag, 59-74.

--- 2010a. An Old Babylonian Itinerary along the Ḫābūr. *In:* KÜHNE, H. (ed.) *Dūr-Katlimmu 2008 and Beyond.* Wiesbaden: Harrassowitz Verlag, 33-47.

--- 2010b. *Reading and writing in Babylon,* Cambridge, Mass., Harvard University Press.

CHARPIN, D. & J.-M. DURAND 1986. "Fils de Sim'al": les origines tribales des rois de Mari. *Revue d'assyriologie et d'archéologie orientale,* 80**,** 141-183.

--- 1987. Le nom antique de Tell Rimāh. *Revue d'Assyriologie et d'archéologie orientale,* 81**,** 125-146.

CHARPIN, D., F. JOANNÈS, S. LACKENBACHER & B. LAFONT 1988. *Archives Épistolaires de Mari I/2,* Paris, ERC.

CHARPIN, D. & N. ZIEGLER 2003. *Mari et le Proche-Orient à l'Époque Amorrite. Essai d'histoire politique,* Paris, SEPOA.

CHERUBINI, P., T. HUMBEL, H. BEECKMAN, H. GÄRTNER, D. MANNES, C. PEARSON, W. SCHOCH, R. TOGNETTI & S. LEV-YADUN 2014. The olive-branch dating of the Santorini eruption. *Antiquity,* 88**,** 267-291.

CIVIL, M. 1964. A Hymn to the Beer Goddess and a Drinking Song. *Studies Presented to A. Leo Oppenheim June 7, 1964.* Chicago, IL: The Oriental Institute of the University of Chicago, 67-89.

--- 1994. *The Farmer's Instructions: A Sumerian Agricultural Manual,* Barcelona, AUSA.

CLUTTON-BROCK, J. 1992. *Horse Power: A History of the Horse and the Donkey in Human Societies,* Cambridge, MA, Harvard University Press.

--- 1999. *A Natural History of Domesticated Animals,* Cambridge, Cambridge University Press.

CLUTTON-BROCK, J. & S. DAVIES 1993. More Donkeys from Tell Brak. *Iraq,* 55**,** 209-221.

COAD, B. W. 2010. *Freshwater Fishes of Iraq,* Sofia and Moscow, Pensoft.

COHEN, M. E. 1993. *The Cultic Calendars of the Ancient Near East,* Bethesda, ML, CDL Press.

--- 2015. *Festivals and Calendars of the Ancient Near East*, Capital Decisions.

COLLINS, B. J. (ed.) 2002. *A History of the Animal World in the Ancient Near East,* Leiden: Brill.

COLLINS, R. 2006. Mann's transformation of the classic sociological traditions. *In:* HALL, J. A. & SCHROEDER, R. (eds.) *An Anatomy of Power: The social theory of Michael Mann.* Cambridge: Cambridge University Press, 19-32.

COOPER, L. 2013. Cultural Developments in Western Syria and the Middle Euphrates Valley During the Third Millennium BC. *In:* CRAWFORD, H. (ed.) *The Sumerian World.* London & New York: Routledge, 478-497.

CÓRDOBA, J. M. 1990. Tell es-Seman=Ahuna? Stationen einer altbabylonischen Reiseroute durch das Balih-Tal. *Altorientalische Forschungen,* 17**,** 360-378.

CORNILLE, A., P. GLADIEUX, M. J. SMULDERS, I. ROLDÁN-RUIZ, F. LAURENS, B. LE CAM, A. NERSESYAN, J. CLAVEL, M. OLONOVA & L. FEUGEY 2012. New insight into the history of domesticated apple: secondary contribution of the European wild apple to the genome of cultivated varieties. *PLoS Genetics,* 8**,** e1002703.

COURTY, M.-A. & H. WEISS 1997. The Scenario of Environmental Degradation in the Tell Leilan Region, Ne Syria, During the Late Third Millennium Abrupt Climate Change. *In:* DALFES, H. N., KUKLA, G. & WEISS, H. (eds.) *Third Millennium BC Climate Change and Old World Collapse.* Berlin & Heidelberg: Springer, 107-147.

CRAWFORD, H. 1981. Some fire installations from Abu Salabikh, Iraq (Dedicatd to the memory of Margaret Munn-Rankin). *Paléorient,* 7**,** 105-114.

CREWE, L. & I. HILL 2012. Finding Beer in the Archaeological Record: A Case Study from Kissonerga-*Skalia* on Bronze Age Cyprus. *Levant,* 44**,** 205-237.

CROSSLEY, P., T. CHAMEN & J. KIENZLE 2009. *Rural transport and traction enterprises for improved livelihoods,* Rome, FAO.

CULLEN, H. M., P. B. DEMENOCAL, S. HEMMING, G. HEMMING, F. H. BROWN, T. GUILDERSON & F. SIROCKO 2000. Climate change and the collapse of the Akkadian empire: Evidence from the deep sea. *Geology,* 28**,** 379-382.

CURTIS, J. 1982. Chagar Bazar. *In:* CURTIS, J. (ed.) *Fifty Years of Mesopotamian Discovery. The work of the British School of Archaeology in Iraq 1932-1982.* London: British School of Archaeology in Iraq, 79-85.

CURVERS, H. H. 1991. *The Balikh Drainage in the Bronze Age.* Ph.D., University of Amsterdam.

D'ISTRIA, L. C. 2014. Wool Economy in the Royal Archive of Mari during the Šakkanakku Period. *In:* BRENIQUET, C. & MICHEL, C. (eds.) *The Wool Economy in the Ancient Near East.* Oxford: Oxbow Books, 169-201.

DAHL, G. & A. HJORT 1976. *Having Herds: Pastoral Herd Growth and Household Economy,* Stockholm, University of Stockholm.

DAHL, J. L. 2006. Early Swine Herding. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 31-38.

--- 2007. *The Ruling Family of Ur III Umma: A Prosopographical Analysis of an Elite Family in Southern Iraq 4000 Years Ago,* Leiden, Nederlands Instituut voor het Nabije Oosten.

DALE, G. 2010. *Karl Polanyi: The Limits of the Market,* Cambridge, Polity Press.

--- 2013. 'Marketless Trading in Hammurabi's Time': A Re-appraisal. *Journal of the Economic and Social History of the Orient,* 56**,** 159-188.

DALIX, A.-S. & E. VILA 2007. Wild boar hunting in the Eastern Mediterranean from the 2nd to the 1st millennium BC. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 359-372.

DALLEY, S. 1984. *Mari and Karana. Two Old Babylonian Cities,* London & New York, Longman.

--- 2008. Rimāḫ, Tall ar-. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 11**,** 364-366.

DALLEY, S., C. B. F. WALKER & J. D. HAWKINS 1976. *The Old Babylonian Texts from Tell Al-Rimah,* London, British School of Archaeology in Iraq.

DALMAN, G. 1928-42. *Arbeit und Sitte in Palästina I-VII,* Gütersloh, Bertelsmann.

DAMEROW, P. 2011. Sumerian Beer: The Origins of Brewing Technology in Ancient Mesopotamia. *Cuneiform Digital Library Journal,* 2011**,** 1-20.

DANE, F. & J. LIU 2007. Diversity and origin of cultivated and citron type watermelon (*Citrullus lanatus*). *Genetic Resources and Crop Evolution,* 54**,** 1255-1265.

DANTI, M. 2000. *Early Bronze Age Settlement and Land Use in the Tell es-Sweyhat Region, Syria.* Ph.D., University of Pennsylvania.

DAVIDSON, T. E. & H. MCKERRELL 1976. Pottery Analysis and Halaf Period Trade in the Khabur Headwaters Region. *Iraq,* 38**,** 45-56.

DAVIES, S. 2004. Pylos Regional Archaeological Project, part vi: administration and settlement in Venetian Navarino. *Hesperia,* 73.

DAZA, A., J. RUIZ, A. I. REY, A. OLIVARES & C. LÓPEZ-BOTE 2005. Evolution of production system of Iberian pigs in Spain. *In:* RAMALHO RIBEIRO, J. M. C., HORTA, A. E. M., MOSCONI, C. & ROSATI, A. (eds.) *Animal products from the Mediterranean area.* Wageningen: Wageningen Academic Publishers, 177-184.

DE BOER, R. 2014. *Amorites in the Early Old Babylonian Period.* Ph.D., University of Leiden.

DE LILLIS FORREST, F., L. MILANO & L. MORI 2007. The Akkadian occupation in the northwest area of the Tell Leilan acropolis. *Kaskal,* 4.

DE VARTAVAN, C. 1990. Contaminated Plant-foods from the Tomb of Tutankhamun: A New Interpretive System. *Journal of Archaeological Science,* 17**,** 473-494.

DECKERS, K. & H. PESSIN 2010. Vegetation development in the Middle Euphrates and Upper Jazirah (Syria/Turkey) during the Bronze Age. *Quaternary Research,* 74**,** 216-226.

DECKERS, K. & S. RIEHL 2008. Resource Exploitation of the Upper Khabur Basin (NE Syria) During the 3rd Millennium BC. *Paléorient,* 34**,** 173-189.

DEE, M. W., J. M. ROWLAND, T. F. G. HIGHAM, A. J. SHORTLAND, F. BROCK, S. A. HARRIS & C. BRONK RAMSEY 2012. Synchronising radiocarbon dating and the Egyptian historical chronology by improved sample selection. *Antiquity,* 86**,** 868-883.

DEIMEL, A. 1931. *Sumerische Tempelwirtschaft zur Zeit Urukaginas und seiner Vorgänger,* Rome, Pontificium Institutum Biblicum.

DELILLE, G. 1977. *Agricoltura e demografia nel Regno di Napoli nei secoli xviii e xix,* Naples, Guida Editori.

DEMARRAIS, E., L. JAIME CASTILLO & T. EARLE 1996. Ideology, Materialization, and Power Strategies. *Current Anthropology,* 37**,** 15-31.

DEMIR, T., R. WESTAWAY, D. R. BRIDGLAND, M. PRINGLE, S. YURTMEN, A. BECK & G. ROWBOTHAM 2007a. Ar-Ar dating of late Cenozoic basaltic volcanism in northern Syria: Implications for the history of incision by the River Euphrates and uplift of the northern Arabian Platform. *Tectonics,* 26.

DEMIR, T., R. WESTAWAY, D. R. BRIDGLAND & A. SEYREK 2007b. Terrace staircases of the River Euphrates in southeast Turkey, northern Syria and western Iraq: evidence for regional surface uplift. *Quaternary Science Reviews,* 26**,** 2844-2863.

DERCKSEN, J. G. 2001. "When we met in Hattuš" - Trade according to Old Assyrian texts from Alishar and Boğazköy. *In:* SOLDT, W. H. (ed.) *Veenhof Anniversary Volume. Studies Presented to Klaas R. Veenhof on the Occasion of his Sixty-Fifth Birthday.* Leiden: Nederlands Instituut voor het Nabije Oosten, 39-66.

--- 2004. *Old Assyrian Institutions,* Leiden, Nederlands Instituut voor het Nabije Oosten.

DIAKONOFF, I. M. 1952. O ploščadi i sostave naselenija šumerskogo 'goroda-gosudarstva'. *Vestnik Drevnej Istorii,* 2**,** 77-93.

--- 1969. The Rise of the Despotic State in Ancient Mesopotamia. *In:* DIAKONOFF, I. M. (ed.) *Ancient Mesopotamia - Socio-Economic History: A Collection of Studies by Soviet Scholars.* Moscow: USSR Academy of Sciences, 173-203.

DIAMOND, J. 1997. *Guns, Germs, and Steel: A Short History of Everybody for the Last 13,000 Years,* London, Chatto & Windus.

DIETLER, M. & I. HERBICH 2006. Liquid material culture: following the flow of beer among the Luo of Kenya. *In:* WOTZKA, H.-P. (ed.) *Grundlegungen. Beiträge zur europäischen und afrikanischen Archäologie für Manfred K.H. Eggert.* Tübingen: Francke Verlag, 395-408.

DIETRICH, M. & O. LORETZ 2004. Alalaḫ-Texte der Schict VII (I). Historische und juristische Dokumente. *Ugarit-Forschungen,* 36**,** 43-150.

--- 2005. Alalaḫ-Texte der Schicht VII (II). Schuldtexte, Vermerke und Sonstiges. *Ugarit-Forschungen,* 37**,** 241-314.

--- 2006. Alalaḫ-Texte der Schicht VII (III). Die Listen der Gruppen ATaB 40, ATaB 42, ATaB 43 und ATaB 44. *Ugarit-Forschungen,* 38**,** 87-137.

DILLEMANN, L. 1962. *Haute Mésopotamie orientale et pays adjacents: Contribution à la géographie historique de la règion du Ves. avant l'ère chrétienne au VIes. de cette ère,* Paris, Geuthner.

DIRECTORATE GENERAL OF ANTIQUITIES 1970. *Archaeological Sites in Iraq,* Baghdad.

--- 1976. *Atlas of the Archaeological Sites in Iraq,* Baghdad, Republic of Iraq Ministry of Information Directorate General of Antiquities/Al-Huria Printing.

DUC, G., S. BAO, M. BAUM, B. REDDEN, M. SADIKI, M. JOSE SUSO, M. VISHNIAKOVA & X. ZONG 2010. Diversity maintenance and use of *Vicia faba* L. genetic resources. *Field Crops Research,* 115**,** 270-278.

DURAND, J.-M. 1983. *Textes administratifs des salles 134 et 160 du palais de Mari,* Paris, Geuthner.

--- 1984. Sur un emploi du verbe *bulluṭum. MARI,* 3.

--- 1985. La situation historique des Šakkanakku: nouvelle approche. *MARI,* 4**,** 147-172.

--- 1988. Les Anciens de Talhayûm. *Revue d'assyriologie et d'archéologie orientale,* 82**,** 97-114.

--- 1997. *Documents Épistolaires du Palais de Mari. Tome I,* Paris, CERF.

--- 1998. *Documents Épistolaires du Palais de Mari. Tome II,* Paris, CERF.

--- 2000. *Documents Épistolaires du Palais de Mari. Tome III,* Paris, CERF.

--- 2001. Une alliance matrimoniale entre un marchand assyrien de Kanesh et un marchand Mariote. *In:* SOLDT, W. H. (ed.) *Veenhof Anniversary Volume. Studies Presented to Klaas R. Veenhof on the Occasion of his Sixty-Fifth Birthday.* Leiden: Niederlands Instituut vor heet Nabije Oosten, 119-132.

--- 2002. *Le Culte d'Addu d'Alep et l'Affaire d'Alahtum,* Paris, SEPOA.

DURAND, J.-M. & M. GUICHARD 1997. Les rituels de Mari. *Recueil d'études à la mémoire de Marie-Thérèse Barrelet.* Paris: SEPOA, 19-78.

EARLE, T. 1987. Chiefdoms in archaeological and ethnohistorical perspectives. *Annual Review of Anthropology,* 16**,** 279-308.

--- 2002. *Bronze Age Economics: The Beginnings of Political Economies,* Boulder, CO, Westview.

EARLE, T. & M. J. KOLB 2010. Regional Settlement Patterns. *In:* EARLE, T. & KRISTIANSEN, K. (eds.) *Organizing Bronze Age Societies: The Mediterranean, Central Europe, & Scandinavia Compared.* Cambridge: Cambridge University Press, 57-86.

EARLE, T. & K. KRISTIANSEN (eds.) 2010. *Organizing Bronze Age Societies: The Mediterranean, Central Europe, & Scandinavia Compared,* Cambridge: Cambridge University Press.

EASTHAM, A. 2009. The Bird Bones from Abu Salabikh. *Iraq,* 71**,** 99-114.

EDWARDS, C. J., J. F. BAIRD & D. E. MACHUGH 2007a. Taurine and zebu admixture in Near Eastern cattle: a comparison of mitochondrial, autosomal and Y-chromosomal data. *Animal Genetics,* 38**,** 520-524.

EDWARDS, C. J., R. BOLLONGINO, A. SCHEU, A. CHAMBERLAIN, A. TRESSET, J.-D. VIGNE, J. F. BAIRD, G. LARSON, S. Y. W. HO, T. H. HEUPINK, B. SHAPIRO, A. R. FREEMAN, M. G. THOMAS, R.-M. ARBOGAST, B. ARNDT, L. BARTOSIEWICZ, N. BENECKE, M. BUDJA, L. CHAIX, A. M. CHOYKE, E. COQUEUGNIOT, H.-J. DÖHLE, H. GÖLDNER, S. HARTZ, D. HELMER, B. HERZIG, H. HONGO, M. MASHKOUR, M. ÖZDOGAN, E. PUCHER, G. ROTH, S. SCHADE-LINDIG, U. SCHMÖLCKE, R. J. SCHULTING, E. STEPHAN, H.-P. UERPMANN, I. VÖRÖS, B. VOYTEK, D. G. BRADLEY & J. BURGER 2007b. Mitochondrial DNA analysis shows a Near Eastern Neolithic origin for domestic cattle and no indication of domestication of European aurochs. *Proceedings of the Royal Society of London B: Biological Sciences,* 274**,** 1377-1385.

EDZARD, D. O. 2003. *Sumerian Grammar,* Leiden, Brill.

EIDEM, J. 1985. A Note on the Pulse Crops at Tell Shemshara. *Bulletion of Sumerian Agriculture,* II**,** 141-143.

--- 1989. Some Remarks on the Iltani Archive from Tell al Rimah. *Iraq,* 51**,** 67-78.

--- 1991. Tell Leilan Tablets 1987. A Preliminary Report. *Annales Archéologiques Arabes Syriennes,* 37/38 (1987/88)**,** 110-127.

--- 1992. *The Shemshara Archives 2: The Administrative Texts,* Copenhagen, Royal Danish Academy of Sciences and Letters.

--- 2000. Northern Jezira in the 18th century BC. Aspects of geo-political patterns. *Subartu,* 7**,** 255-264.

--- 2008a. Apum: A Kingdom on the Old Assyrian Route. *In:* WÄFLER, M. (ed.) *Mesopotamia. The Old Assyrian Period.* Fribourg & Göttingen: Academic Press & Vandenhoeck & Ruprecht, 265-351.

--- 2008b. Old Assyrian Trade in Northern Syria: The Evidence from Tell Leilan. *In:* DERCKSEN, J. G. (ed.) *Anatolia and the Jazira during the Old Assyrian Period.* Leiden: Instituut vor heet Nabije Oosten, 31-41.

--- 2011a. *The Royal Archives from Tell Leilan: Old Babylonian Letters and Treaties from the Lower Town Palace East,* Leiden, Nederlands Instituut voor het Nabije Oosten.

--- 2011b. The Towers of Shemshara. *In:* BARJAMOVIC, G., DAHL, J. L., KOCH, U., SOMMERFELD, W. & WESTENHOLZ, J. G. (eds.) *Akkade is King: a collection of papers by friends and colleagues presented to Aage Westenholz on the occasion of his 70th birthday 15th of May 2009.* Leiden: Nederlands Instituut voor het Nabije Oosten, 79-92.

--- 2012. Dokan. An archaeological salvage project in Iraq, 1956-60. *Annual Report - The Netherlands Institute for the Near East, Leiden/,* 2011**,** 12-19.

--- 2013. Back to Rania. *Annual Report - The Netherlands Institute for the Near East, Leiden/,* 2012**,** 3-11.

--- 2014. The Kingdom of Šamšī-Adad and its Legacies. *In:* CANCIK-KIRSCHBAUM, E., BRISCH, N. & EIDEM, J. (eds.) *Constituent, Confederate, and Conquered Space: The Emergence of the Mitanni State.* Berlin: De Gruyter, 137-146.

---. 2015. *NINO Archaeological Project on the Rania Plain* [Online]. Leiden: Nederlands Instituut voor het Nabije Oosten. Available: http://www.nino-leiden.nl/projects/nino-archaeological-project-on-the-rania-plain-iraq [Accessed 27 August 2016].

EIDEM, J., I. FINKEL & M. BONECHI 2001. The Third-Millennium Inscriptions. *In:* OATES, D., OATES, J. & MCDONALD, H. (eds.) *Excavations at Tell Brak II: Nagar in the third millennium BC.* London: British School of Archaeology in Iraq, 99-120.

EIDEM, J. & J. LÆSSØE 2001. *The Shemshara Archives 1: The Letters,* Copenhagen, Royal Danish Academy of Sciences and Letters.

EIDEM, J. & D. WARBURTON 1996. In the Land of Nagar: A Survey around Tell Brak. *Iraq,* 58**,** 51-64.

EINWAG, B. 1993. Vorbericht über die archäologische Geländebegehung in der West-Gazira. *Damaszener Mitteilungen,* 7**,** 23-43.

ELDEN, S. 2009. *Terror and Territory: The Spatial Extent of Sovereignty,* Minneapolis, MN, University of Minnesota Press.

ELLIS, R. S. 1993. Mühle. B. Archäologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 8, 401-404.

ELLISON, R. 1978. *A Study of Diet in Mesopotamia (c.3000-600 BC) and Associated Agricultural Techniques and Methods of Food Preparation.* Ph.D., University of London.

--- 1981. Diet in Mesopotamia: The Evidence of the Barley Ration Texts (c. 3000-1400 B.C.). *Iraq,* 43, 35-45.

ELLISON, R., J. RENFREW, D. BROTHWELL & N. SEELEY 1978. Some food offerings from Ur, excavated by Sir Leonard Woolley, and previously unpublished. *Journal of Archaeological Science,* 5, 167-177.

ENGLUND, R. 1990. *Organisation und Verwaltung der Ur III-Fischerei,* Berlin, Dietrich Reimer.

--- 1991. Hard Work - Where Will It Get You? Labor Management in Ur III Mesopotamia. *Journal of Near Eastern Studies,* 50, 255-280.

ESCALONA, J. & A. REYNOLDS (eds.) 2011. *Scale and Scale Change in the Early Middle Ages,* Turnhout: Brepols.

EVANS, R. J. 2000. *In Defence of History,* London, Granta Books.

FAIRBAIRN, A., F. KULAKOGLU & L. ATICI 2014. Archaeobotanical evidence for trade in hazelnut (Corylus sp.) at Middle Bronze Age Kultepe (c. 1950-1830 BC), Kayseri Province, Turkey. *Vegetation History and Archaeobotany,* 23, 167-174.

FAIRBAIRN, A. & S. OMURA 2013. Archaeological identification and significance of *ÉSAG* (agricultural storage pits) at Kaman-Kalehöyük, central Anatolia. *Anatolian Studies,* 55, 15-23.

FALES, F. M. 1990. The Rural Landscape of the Neo-Assyrian Empire: A Survey. *State Archives of Assyria Bulletin,* 4, 81-142.

FALKENSTEIN, A. 1954. La Cité-Temple Sumérienne. *Cahiers de l'Histoire Mondiale,* 1, 784-814.

--- 1974. *The Sumerian Temple City,* Los Angeles, Undena Publications.

FALL, A., R. A. PEARSON, P. R. LAURENCE & S. FERNÁNDEZ-RIVERA 1997. *Feeding and Working Strategies for Oxen used for Draft Purposes in Semi-arid West Africa,* Nairobi, International Livestock Research Institute.

FAO 1973. *Energy and Protein Requirements. Report of a Joint FAO/WHO Ad Hoc Expert Committee,* Geneva, World Health Organization.

---. 1977. *FAO-Unesco Soil map of the world 1:5000000: Volume VII South Asia*. Paris: Unesco.

FAUST, M., D. SURÁNYI & F. NYUJTÓ 1997. Origin and Dissemination of Apricot. *Horticultural Reviews,* 22, 225-266.

FELIU, L. 2003. *The God Dagan in Bronze Age Syria,* Leiden & Boston, Brill.

FIELDEN, K. 1979. Archäologische Geländebegehung im Gebiet des unteren Ǧaǧǧaǧ. *Archiv für Orientforschung,* 26, 172.

FINET, A. 1977. Le vin à Mari. *Archiv für Orientforschung,* 25, 122-131.

FINKELSTEIN, I. & D. LANGGUT 2014. Dry Climate in the Middle Bronze I and Its Impact on Settlement Patterns in the Levant and Beyond: New Pollen Evidence. *Journal of Near Eastern Studies,* 73**,** 219-234.

FINLEY, M. I. 1985. *The Ancient Economy,* Berkely & Los Angeles, CA, University of California Press.

FINNÉ, M., K. HOLMGREN, H. S. SUNDQVIST, E. WEIBERG & M. LINDBLOM 2011. Climate in the eastern Mediterranean, and adjacent regions, during the past 6000 years – A review. *Journal of Archaeological Science,* 38**,** 3153-3173.

FIORENTINO, G., V. CARACUTA, G. CASIELLO, F. LONGOBARDI & A. SACCO 2012. Studying ancient crop provenance: implications from δ^{13}C and δ^{15}N values of charred barley in a Middle Bronze Age silo at Ebla (NW Syria). *Rapid Communications in Mass Spectrometry,* 26**,** 327-335.

FLANNERY, K. V. 1972. The Cultural Evolution of Civilizations. *Annual Review of Ecology and Systematics,* 3**,** 399-426.

--- 1998. The Ground Plans of Archaic States. *In:* FEINMAN, G. M. & MARCUS, J. (eds.) *Archaic States.* Santa Fe, NM: School of American Research Press, 15-57.

FLEMING, D. E. 2004. *Democracy's Ancient Ancestors: Mari and Early Collective Governance,* Cambridge, Cambridge University Press.

--- 2014. Chasing Down the Mundane: The Near East with Social Historical Interest. *Journal of Ancient Near Eastern History,* 1**,** 5-20.

FORLANINI, M. 2006. Étapes et Itinéraires entre Aššur et l'Anatolie des Marchands Paléo-Assyriens: Noveaux Documents et Nouveaux Problèmes. *Kaskal,* 3**,** 147-175.

FOSTER, B. R. 1981. A New Look at the Sumerian Temple State. *Journal of the Economic and Social History of the Orient,* 24**,** 225-241.

FOWLER, M. J. F. 2013. Declassified Intelligence Satellite Photographs. *In:* HANSON, W. S. & OLTEAN, I. A. (eds.) *Archaeology from Historical Aerial and Satellite Archives.* New York: Springer, 47-66.

FRANKEL, R. 1999. *Wine and Oil Production in Antiquity in Israel and Other Mediterranean Countries,* Sheffield, Sheffield Academic Press.

FREYDANK, H. 1994. Drei Tafeln aus der Verwaltung des mittelassyrischen Kronlandes. *Altorientalische Forschungen,* 21**,** 13-30.

FUJII, S. & T. ADACHI 2010. Archaeological Investigations of Bronze Age Cairn Fields on the Northwestern Flank of Mt. Bishri. *Al-Rāfidān***,** 61-77.

FULLER, R. J. & L. AYE 2012. Human and animal power - The forgotten renewables. *Renewable Energy,* 48**,** 326-332.

GADD, C. J. 1937. Tablets from Chagar Bazar, 1936. *Iraq,* 4**,** 178-185.

--- 1940. Tablets from Chagar Bazar and Tell Brak. *Iraq,* 7**,** 22-66.

GADE, D. W. 1999. Pigs (Hogs). *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 536-542.

GALIATSATOS, N., T. J. WILKINSON, D. N. M. DONOGHUE & G. PHILIP 2009. The Fragile Crescent Project (FCP): Analysis of Settlement Landscapes

Using Satellite Imagery. *Computer Applications to Archaeology 2009.* Williamsburg, Virginia.

GALLANT, T. W. 1991. *Risk and Survival in Ancient Greece: Reconstructing the Rural Domestic Economy,* Stanford, CA, Stanford University Press.

GARFINKLE, S. J. 2008. Was the Ur III state bureaucratic? Patrimonialism and bureaucracy in the Ur III Period. *In:* GARFINKLE, S. J. & JOHNSON, J. C. (eds.) *The Growth of an Early State in Mesopotamia: Studies in Ur III Administration. Proceedings of the First and Second Ur III Workshops at the 49th and 51th Rencontre Assyriologique Internationale, London July, 10 2003 and Chicago July 19, 2005.* Madrid: Consejo Superior de Investigaciones Científicas, 55-62.

GARNSEY, P. 1999. *Food and Society in Classical Antiquity,* Cambridge, Cambridge University Press.

GASCHE, H., J. A. ARMSTRONG, S. W. COLE & V. G. GURZADYAN 1998. *Dating the Fall of Babylon: A Reappraisal of Second-Millennium Chronology,* Ghent, University of Ghent.

GASPA, S. 2011. Bread for Gods and Kings: on Baked Products in Profane and Cultic Consumption of Ancient Assyria. *Food and History,* 9**,** 3-21.

GATES, M.-H. 1988. Dialogues between Ancient Near Eastern Texts and the Archaeological Record: Test Cases from Bronze Age Syria. *Bulletin of American Schools of Oriental Research,* 270**,** 63-91.

GEBREGZIABHER, S., A. M. MOUAZEN, H. VAN BRUSSEL, H. RAMON, J. NYSSEN, H. VERPLANCKE, M. BEHAILU, J. DECKERS & J. DE BAERDEMAEKER 2006. Animal drawn tillage, the Ethiopian ard plough, *maresha*: A review. *Soil and Tillage Research,* 89**,** 129-143.

GEERTZ, C. 2004. What Is a State If It Is Not A Sovereign? *Current Anthropology,* 45**,** 577-593.

GELB, I. J. 1965. The Ancient Mesopotamian Ration System. *Journal of Near Eastern Studies,* 24**,** 230-243.

--- 1967. Growth of a Herd of Cattle in Ten Years. *Journal of Cuneiform Studies,* 21**,** 64-69.

--- 1969. On the Alleged Temple and State Economies in Ancient Mesopotamia. *Studi in onore di Edoardo Volterra 6.* Milan: Guiffre, 137-154.

--- 1979. Household and Family in Early Mesopotamia. *In:* LIPINSKI, E. (ed.) *State and Temple Economy in the Ancient Near East.* Leuven: Department Oriëntalistiek, 1-98.

GENZ, H. 2012. The Northern Levant. *In:* POTTS, D. T. (ed.) *A Companion to the Archaeology of the Ancient Near East.* Oxford: Blackwell, 607-628.

GIBSON, M. 1972. Umm El-Jir, a town in Akkad. *Journal of Near Eastern Studies,* 31**,** 237-294.

GILBERT, A. S. 2002. The Native Fauna of the Ancient Near East. *In:* COLLINS, B. J. (ed.) *A History of the Animal World in the Ancient Near East.* Leiden: Brill, 3-78.

GLEDHILL, J. & M. T. LARSEN 1982. The Polanyi Paradigm and a Dynamic Analysis of Archaic States. *In:* RENFREW, C., ROWLANDS, M. J. &

SEAGRAVES, B. A. (eds.) *Theory and Explanation in Archaeology.* New York: Academic, 197-229.

GODDEERIS, A. 2002. *Economy and Society in Northern Babylonia in the Early Old Babylonian Period (ca. 2000 - 1800 BC),* Leuven, Peeters.

GOE, M. R. & R. E. MCDOWELL 1980. *Animal Traction: Guidelines for Utilization,* Ithaca, NY, Cornell University.

GOETZE, A. 1953. An Old Babylonian Itinerary. *Journal of Cuneiform Studies,* 7**,** 51-72.

GOLDSTONE, J. A. 2006. A historical, not comparative, method: breakthroughs and limitations in the theory and methodology of Michael Mann's analysis of power. *In:* HALL, J. A. & SCHROEDER, R. (eds.) *An Anatomy of Power: the Social Theory of Michael Mann.* Cambridge: Cambridge University Press, 263-282.

GORNY, R. L. 1995. Viticulture and Ancient Anatolia. *In:* MCGOVERN, P. E., FLEMING, S. J. & KATZ, S. H. (eds.) *The Origins and Ancient History of Wine.* Luxembourg: Gordon & Breach, 133-174.

GRÉGOIRE, J. P. 1996. *Archives administratives et inscriptions cunéiformes: Ashmolean Museum, Bodleian Collection, Oxford,* Paris, Geuthner.

GRÉGOIRE, J. P. & J. RENGER 1988. Die Interdependenz der wirtschaftlichen und gesellschaftlich-politischen Strukturen von Ebla. Erwägungen zum System der Oikos-Wirtschaft in Ebla. *In:* WAETZOLDT, H. & HAUPTMANN, H. (eds.) *Wirtschaft und Gesellschaft von Ebla.* Heidelberg: Heidelberger Orientverlag, 211-224.

GRIFFITHS, H. I., A. SCHWALB & L. R. STEVENS 2001. Evironmental change in southwestern Iran: the Holocene ostracod fauna of Lake Mirabad. *The Holocene,* 11**,** 757-764.

GRIGSON, C. 1996. Early Cattle around the Indian Ocean. *In:* READE, J. (ed.) *The Indian Ocean in Antiquity.* Kegan Paul, 41-74.

--- 2007. Culture, ecology, and pigs from the 5th to the 3rd millennium BC around the Fertile Crescent. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 83-108.

--- 2012. Size Matters - Donkeys and Horses in the Prehistory of the Southernmost Levant. *Paléorient,* 38**,** 185-201.

--- 2015. The fauna of Tell Nebi Mend (Syria) in the Bronze and Iron Age - a diachronic overview. Part 1: Stability and change - animal husbandry. *Levant,* 47**,** 5-29.

GRIGSON, C., Y. EDWARDS & R. CERÓN-CARRASCO 2015. The fauna of Tell Nebi Mend (Syria) in the Bronze and Iron Age - a diachronic overview. Part 2: hunting, fowling and fishing. *Levant,* 47**,** 164-185.

GRINDER, M. I., P. R. KRAUSMAN & R. S. HOFFMANN 2006. *Equus asinus*. *Mammalian Species,* 794**,** 1-9.

GROVES, C. 2007. Current views on taxonomy and zoogeography of the genus *Sus*. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 15-29.

GUICHARD, M. 2014. Political Space - Local Political Structures in Northern Syria: The Case of the Country of Ida-Maraṣ in the Eighteenth Century BC. *In:* CANCIK-KIRSCHBAUM, E., BRISCH, N. & EIDEM, J. (eds.) *Constituent, Confederate, and Conquered Space: The Emergence of the Mitanni State.* Berlin: De Gruyter, 147-162.

GULLBEKK, S. H. 2008. Coinage and monetary economies. *In:* BRINK, S. & PRICE, N. (eds.) *The Viking World.* Oxford: Routledge, 159-169.

GÜNBATTI, C. 2008. An Eponym LIst (KEL G) from Kültepe. *Altorientalische Forschungen,* 35**,** 103-132.

HALL, J. A. & R. SCHROEDER (eds.) 2006. *An Anatomy of Power: The Social Theory of Michael Mann,* Cambridge: Cambridge University Press.

HALL, T. D., P. N. KARDULIAS & C. CHASE-DUNN 2011. World-Systems Analysis and Archaeology: Continuing the Dialogue. *Journal of Archaeological Research,* 19**,** 233-279.

HALLO, W. W. 1964. The Road to Emar. *Journal of Cuneiform Studies,* 18**,** 57-88.

HALSTEAD, P. 1995. Plough and Power: the economic and social significance of cultivation with the ox-drawn ard in the Mediterranean. *Bulletin of Sumerian Agriculture,* 8**,** 11-22.

--- 2014. *Two Oxen Ahead: Pre-Mechanized Farming in the Mediterranean,* Chichester, Wiley-Blackwell.

HALSTEAD, P. & V. ISAAKIDOU 2011. A pig fed by hand is worth two in the bush: Ethnoarchaeology of pig husbandry in Greece and its archaeological implications. *In:* ALBARELLA, U. & TRENTACOSTE, A. (eds.) *Ethnozooarchaeology: The Present and Past of Human-Animal Relationships.* Oxford and Oakville: Oxbow Books, 160-174.

HALSTEAD, P. & G. JONES 1989. Agrarian Ecology in the Greek Islands: Time Stress, Scale and Risk. *The Journal of Hellenic Studies,* 109**,** 41-55.

HARRIS, M. 2001. *Cultural Materialism: The Struggle for a Science of Culture,* Walnut Creek, CA, Altamira Press.

HARRISON, D. L. 1968. *Mammals of Arabia,* London, Ernest Benn.

HART, T. C. 2014. *Phytoliths, Starch Grains, and Emerging Social Complexity at Tell Zeidan, Syria.* Ph.D., University of Connecticut.

HARTMAN, L. F. & A. L. OPPENHEIM 1950. *On Beer and Brewing Techniques in Ancient Mesopotamia,* Baltimore, American Oriental Society.

HARVEY, A. 1989. *Economic Expansion in the Byzantine Empire 900-1200,* Cambridge, Cambridge University Press.

HATT, R. T. 1959. *The Mammals of Iraq,* Ann Arbor, MI, University of Michigan.

HAWKES, C. 1954. Archeological Theory and Method: Some Suggestions from the Old World. *American Anthropologist,* 56**,** 155-168.

HAYWOOD, J. A. & H. M. NAHMAD 2003. *A New Arabic Grammar of the Written Language. Second Edition,* London, Lund Humphries.

HEIMPEL, W. 1995. Plow animal inspection records from Ur III Girsu and Umma. *Bulletin of Sumerian Agriculture,* 8**,** 71-171.

--- 1996. Moroccan Locusts in Qaṭṭunan. *Revue d'assyriologie et d'archéologie orientale,* 90**,** 101-119.

--- 2003a. *Letters to the King of Mari,* Winona Lake, IN, Eisenbrauns.

--- 2003b. On the recently published Old Babylonian texts from Tuttul. *Orientalia,* 72**,** 307-326.

HEINZ, M. 1992. *Tell Atchana/Alalakh: Die Schichten VII-XVII,* Neukirchen-Vluyn, Butzon & Becker.

HELBÆK, H. 1960. Ancient crops in the Shahrzoor valley in Iraqi Kurdistan. *Sumer,* 16**,** 79-81.

--- 1963. Isin-Larsa and Horian Food Remains at Tell Bazmosian in the Dokan Valley. *Sumer,* 19**,** 27-35.

--- 1966. The plant remains from Nimrud. *In:* MALLOWAN, M. E. L. (ed.) *Nimrud and its Remains Vol. 2.* London: Collins, 613-618.

HELMER, D., L. GOURICHON, H. MONCHOT, J. PETERS & M. SAÑA SEGUI 2005. Identifying early domestic cattle from Pre-Pottery Neolithic sites on the Middle Euphrates using sexual dimorphism. *In:* VIGNE, J.-D., HELMER, D. & PETERS, J. (eds.) *The First Steps of Animal Domestication: New Archaeozoological Approaches.* Oxford: Oxbow, 86-95.

HELMER, D., L. GOURICHON & E. VILA 2007. The development of the exploitation of products from *Capra* and *Ovis* (meat, milk, and fleece) from the PPNB to the Early Bronze in the northern Near East. *Anthropozoologica,* 42**,** 41-69.

HENRY, M., S. M. MCDONNELL, L. D. LODI & E. L. GASTAL 1991. Pasture mating behaviour of donkeys (*Equus minus*) at natural and induced oestrus. *Journal of Reproduction & Fertility,* 44**,** 77-86.

HERLES, M. 2007. Der Vogel Strauß in den Kulturen Altvorderasiens. *Mitteilungen der Deutschen Orient-Gesellschaft,* 139**,** 173-212.

--- 2012. Strauß. B. Archäologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 13**,** 212-213.

HIENDLEDER, S., B. KAUPE, R. WASSMUTH & A. JANKE 2002. Molecular analysis of wild and domestic sheep questions current nomenclature and provides evidence for domestication from two different subspecies. *Proceedings of the Royal Society of London B: Biological Sciences,* 269**,** 893-904.

HILLMAN, G. C. 1973. Agricultural Productivity and Past Population Potential at Aşvan. *Anatolian Studies,* 23**,** 225-240.

--- 1984. Traditional husbandry and processing of archaic cereals in recent times: The operations, product and equipment which might feature in Sumerian texts. Part I: The glume wheats. *Bulletin of Sumerian Agriculture,* 1**,** 114-152.

HOCKEY, S. 2008. The History of Humanities Computing. *In:* SCHREIBMAN, S., SIEMENS, R. & UNSWORTH, J. (eds.) *A Companion to Digital Humanities.* Oxford & Malden, MA: Blackwell, 3-19.

HOFFNER, H. A. 1997. Hittite Laws. *In:* ROTH, M. T. (ed.) *Law Collections from Mesoptamia and Asia Minor.* Atlanta, GA: Scholars Press, 213-248.

HØJLUND, F. 1990. Date Honey Production in Dilmun in the Mid 2nd Millennium B.C. : Steps in the Technological Evolution of the Madbasa. *Paleorient,* 16**,** 77-86.

HOLE, F. 1980. The Prehistory of Herding: Some Suggestions from Ethnography. *In:* BARRELET, M.-T. (ed.) *L'Archéologie de l'Iraq du début de l'époque* *néolithique à 333 avant notre ère.* Paris: Centre National du Recherche Scientifique, 119-130.

--- 1997. Evidence for mid-Holocene environmental change in the western Khabur drainage, northeastern Syria. *In:* DALFES, H. N., KUKLA, G. & WEISS, H. (eds.) *Third Millennium BC Climate Change and Old World Collapse.* Berlin & Heidelberg: Springer, 67-106.

--- 1998. Palaeoenvironment and human society in the Jezireh of northern Mesopotamia 20,000-6,000 B.P. *Paléorient,* 23**,** 39-49.

HOPFEN, H. J. 1969. *Farm Implements for Arid and Tropical Regions,* Rome, FAO.

HOPKINS, D. C. 1997. Agriculture. *In:* MEYERS, E. M. (ed.) *Oxford Encyclopedia of Archaeology in the Near East.* Oxford: Oxford University Press, 22-30.

HORNSEY, I. S. 2003. *A History of Beer and Brewing,* Cambridge, Royal Society of Chemistry.

--- 2007. *The Chemistry and Biology of Winemaking,* Cambridge, The Royal Society of Chemistry.

HOWARD CARTER, T. 1965. Excavations at Tell al-Rimah, 1964: Preliminary Report. *Bulletin of American Schools of Oriental Research,* 178**,** 40-69.

HRITZ, C. 2013a. A malarial-ridden swamp: using Google Earth Pro and Corona to access the southern Balikh valley, Syria. *Journal of Archaeological Science,* 40**,** 1975-1987.

--- 2013b. Urbanocentric Models and "Rural Messiness": A Case Study in the Balikh River Valley, Syria. *American Journal of Archaeology,* 117**,** 141-161.

--- 2014. Contributions of GIS and Satellite-based Remote Sensing to Landscape Archaeology in the Middle East. *Journal of Archaeological Research,* 22**,** 229-276.

HROZNÝ, B. 1913. *Das Getreide im alten Babylonien. Ein Beitrag zur Kultur- und Wirtschaftsgeschichte des alten Orients,* Vienna, Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften.

HRUŠKA, B. 1984. Die Bodenbearbeitung und Feldbestellung im altsumerischen Lagaš. *Archív Orientální,* 52**,** 150-157.

--- 1990. Das Landwirtschaftliche Jahr im alten Sumer. *Bulletin of Sumerian Agriculture,* 5**,** 105-114.

--- 2007. Agricultural Techniques. *In:* LEICK, G. (ed.) *The Babylonian World.* London: Routledge, 54-65.

HUDSON, M. 2000. Mesopotamia and Classical Antiquity. *American Journal of Economics and Sociology,* 59**,** 3-25.

HUNT, R. C. 1987. The Role of Bureaucracy in the Provisioning of Cities: A Framework for Analysis of the Ancient Near East. *In:* GIBSON, M. & BIGGS, R. D. (eds.) *The Organization of Power: Aspects of Bureaucracy in the Ancient Near East.* Chicago, IL: The Oriental Institute of the University of Chicago, 161-192.

IBRAHIM, J. K. 1986. *Pre-Islamic Settlement in Jazirah.* Ph.D, University of Mosul.

IGGERS, G. C. 2012. *Historiography in the Twentieth Century: From Scientific Objectivity to the Postmodern Challenge,* Middletown, Wesleyan University Press.

INGHOLT, H. 1957. The Danish Dokan Expedition. *Sumer,* 13**,** 214f.

ISAGER, S. & J. E. SKYDSGAARD 1992. *Ancient Greek Agriculture: An Introduction,* London and New York, Routledge.

ISMAIL, B. K. & J. N. POSTGATE 2008. A Middle Assyrian Flock-Master's Archive from Tell Ali. *Iraq,* 70**,** 147-178.

ISMAIL, F. 1991. *Altbabylonische Wirtschaftsurkunden aus Tall Leilan (Syrien).* Ph.D, Eberhard-Karls-Universität Tübingen.

IUSS 2014. *World Reference Base for Soil Resources 2014. International soil classification system for naming soils and creating legens for soil maps,* Rome, FAO.

JACQUES, D., K. DOBNEY & W. VAN NEER 2003. Diet, Economy and Status: Evidence from the Animal Bones. *Excavations at Tell Brak Vol. 4: Exploring an Upper Mesopotamian Regional Centre, 1994-1996.* Cambridge and London: McDonald Institue for Archaeological Research / British School of Archaeology in Iraq, 417-430.

JAKOB, S. 2003. *Mittelassyrische Verwaltung und Sozialstruktur: Untersuchungen,* Leiden and Boston, MA, Brill and Styx.

JANICK, J. 2005. The Origins of Fruits, Fruit Growing, and Fruit Breeding. *Plant Breeding Reviews,* 25**,** 255-321.

JAS, R. M. 2000. Land Tenure in Northern Mesopotamia: Old Sources and the Modern Environment. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia.* Leiden: Nederlands Instituut voor het Nabije Oosten, 247-263.

JASSIM, S. Z. & J. C. GOFF (eds.) 2006. *Geology of Iraq,* Prague: Dolin.

JAWAD, L. A. 2012. History of the Study of the Fish Fauna of Iraq. *Water Research and Management,* 2**,** 11-20.

JAWORSKI, W. 2008. Contents Modelling of Neo-Sumerian Ur III Economic Text Corpus. *Proceedings of the 22nd International Conference on Computational Linguistics (Coling 2008).* Manchester, UK.

--- 2012. Cuneiform Documents Search Engine. *In:* WILHELM, G. (ed.) *Organization, Representation, and Symbols of Power in the Ancient Near East. Proceedings of the 54th Rencontre Assyriologique Internationale at Würzburg 20-25 July 2008.* Winona Lake, IN: Eisenbrauns, 735-738.

JENNINGS, J., K. L. ANTROBUS, S. J. ATENCIO, E. GLAVCH & C. LUU 2005. 'Drinking beer in a blissful mood'. Alcohol production, operational chains, and feasting in the ancient world. *Current Anthropology,* 46**,** 275-303.

JOANNÈS, F., C. KEPINSKI-LECOMTE & G. COLBOW 2006. *Haradum: Les textes de la période paléo-babylonienne (Samsu-iluna-Ammi-ṣaduqa),* Éditions Recherche sur les Civilisations.

JOFFE, A. H. 1998. Disembedded Capitals in Western Asian Perspective. *Comparative Studies in Society and History,* 40**,** 549-580.

JOHANNSEN, N. 2011. Past and present strategies for draught exploitation of cattle. *In:* ALBARELLA, U. & TRENTACOSTE, A. (eds.) *Ethnozooarchaeology: The Present and Past of Human-Animal Relationships.* Oxford and Oakville: Oxbow Books, 13-19.

JOHNSON, M. 2007. *Ideas of Landscape,* Malden, MA, Blackwell.

JUDD, A. 1995. Flax - Some historical considerations. *In:* CUNNANE, S. C. & THOMPSON, L. U. (eds.) *Flaxseed in Human Nutrition.* Champaign, IL: AOCS Press, 1-10.

JURSA, M. 2010. *Aspects of the Economic History of Babylonia in the First Millennium BC: Economic Geography, Economic Mentalities, Agriculture, the Use of Money and the Problem of Economic Growth*, Ugarit-Verlag.

KALAYCI, T. 2013. *Agricultural Production and Stability of Settlement Systems in Upper Mesopotamia during the Early Bronze Age (Third Millennium BCE).* University of Arkansas.

KALBERG, S. 1994. *Max Weber's Comparative-Historical Sociology,* Cambridge, Polity Press.

KANIEWSKI, D., E. PAULISSEN, E. VAN CAMPO, J. BAKKER, K. VAN LERBERGHE & M. WAELKENS 2009. Wild or cultivated *Olea europaea* L. in the eastern Mediterranean during the middle-late Holocene? A pollen-numerical approach. *The Holocene,* 19**,** 1039-1047.

KANIEWSKI, D., E. VAN CAMPO, T. BOIY, J.-F. TERRAL, B. KHADARI & G. BESNARD 2012. Primary domestication and early uses of the emblematic olive tree: palaeobotanical, historical and molecular evidence from the Middle East. *Biological Reviews,* 87**,** 885-899.

KANTNER, J. 2008. The Archaeology of Regions: From Discrete Analytical Toolkit to Ubiquitous Spatial Perspective. *Journal of Archaeological Research,* 16**,** 37-81.

KARIMALI, E. 2005. Lithic Technologies and Use. *In:* BLAKE, E. & KNAPP, A. B. (eds.) *The Archaeology of Mediterranean Prehistory.* Malden, MA: Blackwell, 180-214.

KATZ, S. H. & M. M. VOIGHT 1986. Bread and Beer: the early use of cereals in the human diet. *Expedition,* 28**,** 23-34.

KAUFMAN, C. K. 2006. *Cooking in Ancient Civilizations,* Westport & London, Greenwood Press.

KEMP, B. J. 2006. *Ancient Egypt: Anatomy of a Civilization. Second Edition,* Oxford, Routledge.

KENNEDY, D. 1998. Declassified satellite photographs and archaeology in the Middle East: case studies from Turkey. *Antiquity,* 72**,** 553-561.

KERESTES, T. M. 1982. *Indices to Economic Texts from the Palace of Zimri-Lim (ca. 1782-1759 B.C.).* Ph.D., University of Michigan.

KHATER, A. R. 2003. Intensive groundwater use in the Middle East and North Africa. *In:* RAMON LLAMAS, M. & CUSTODIO, E. (eds.) *Intensive Use of Groundwater: Challenges and Opportunities.* Lisse: Balkema, 355-386.

KILLEN, J. 1993. Records of Sheep and Goats at Mycenaean Knossos and Pylos. *Bulletin of Sumerian Agriculture,* 7**,** 209-218.

KIMURA, B., F. MARSHALL, A. BEJA-PEREIRA & C. MULLIGAN 2013. Donkey Domestication. *African Archaeological Review,* 30**,** 83-95.

KISER, E. 2006. Mann's microfoundations: addressing neo-Weberian dilemmas. *In:* HALL, J. A. & SCHROEDER, R. (eds.) *An Anatomy of Power: The Social Theory of Michael Mann.* Cambridge: Cambridge University Press, 56-70.

KITCHELL, K. F. 2014. *Animals in the Ancient World from A to Z,* London and New York, Routledge.

KLETTER, R. 2014. Vessels and Measures: The Biblical Liquid Capacity System. *Israel Exploration Journal,* 64, 22-37.

KNAPP, A. B. (ed.) 1992. *Archaeology, Annales, and ethnohistory,* Cambridge: Cambridge University Press.

KOH, A. J., A. YASUR-LANDAU & E. H. CLINE 2014. Characterizing a Middle Bronze Palatial Wine Cellar from Tell Kabri, Israel. *PLoS ONE,* 9.

KOHLMEYER, K. 1984. Euphrat - Survey. Die mit Mittel der Gerda Henkel Stiftung durchführte archäologische Geländebegehung im syrischen Euphrattal. *Mitteilungen der Deutschen Orient-Gesellschaft,* 116, 95-118.

--- 1986. Euphrat-Survey 1984. Zweiter Vorbericht über die mit Mitteln der Gerda Henkel Stiftung durchgeführte archäologische Geländebegehung im syrischen Euphrattal. *Mitteilungen der Deutschen Orient-Gesellschaft,* 118, 51-65.

KOLIŃSKI, R. 2007. Sir Max Mallowan's Excavations at Tell Arbid in 1936. *Iraq,* 69, 73-115.

--- 2014a. 20th Century BC in the Khabur Triangle Region and the Advent of the Old Assyrian Trade with Anatolia. *In:* BONATZ, D. (ed.) *The Archaeology of Political Spaces. The Upper Mesopotamian Piedmont in the Second Millennium BC.* Berlin & Boston, MA: De Gruyter, 11-34.

--- 2014b. Report on the Field Activities of the Upper Greater Zab Archaeological Reconnaissance Project for the 2014 Season. Poznań: Adam Mickiewicz University.

--- 2014c. Settled Space. Evidence for Changes in Settlement Patterns of Northern Mesopotamia at the Advent and at the Turn of the Mitanni Era. *In:* CANCIK-KIRSCHBAUM, E., BRISCH, N. & EIDEM, J. (eds.) *Constituent, Confederate, and Conquered Space: The Emergence of the Mitanni State.* Berlin: De Gruyter, 179-212.

KOPANIAS, K., J. MACGINNIS & J. A. UR 2015. Archaeological Projects in the Kurdistan Region in Iraq. The Directorate of Antiquities of Kurdistan.

KOROBKOVA, G. F. 1981. Ancient Reaping Tools and their Productivity in Light of Experimental Traceware Analysis. *In:* KOHL, P. L. (ed.) *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries.* New York, NY: M.E. Sharpe, 325-349.

KOSCHAKER, P. 1941. Zur staatlichen Wirtschaftsverwaltung in altbabylonischer Zeit, insbesondere nach Urkunden aus Larsa. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie,* 47, 135-180.

--- 1950. Eheschliessung und Kauf nach alten Rechten, mit besonderer Berücksichtigung der älteren Keilschriftrechte. *Archiv Orientalni,* 18, 210-296.

KOUCHOKOS, N. 1998. *Landscape and Social Change in Late Prehistoric Mesopotamia.* Ph.D., Yale University.

KOZLOWSKI, S. K. 1989. Nemrik 9, a PPN Neolithic site in Northern Iraq. *Paléorient,* 15, 25-31.

KRAUS, F. R. 1966. *Staatliche Viehhaltung im altbabylonischen Lande Larsa,* Amsterdam.

--- 1968. Sesam im Alten Mesopotamien. *Journal of the American Oriental Society,* 88, 112-119.

--- 1976. Akkadische Wörter und Ausdrücke, X-XI. *Revue d'assyriologie et d'archéologie orientale,* 70, 165-179.

KREBERNIK, M. 2001. *Tall Bi'a/Tuttul II: Die altorientalischen Schriftfunde,* Saarbrücken, Saarbrücker Druckerei und Verlag.

KREBERNIK, M. & E. STROMMENGER 1998. 1980-1995: Tuttul (Tall Bi'a). *In:* GERNOT, W. (ed.) *Zwischen Tigris und Nil: 100 Jahre Ausgrabungen der Deutschen Orient-Gesellschaft in Vorderasien und Ägypten.* Mainz: Philip von Zabern, 126-137.

KRUPP, F. & W. SCHNEIDER 2008. Die Fischfauna des Nahr al-Ḫābūr, Nordost-Syrien. *In:* KÜHNE, H. (ed.) *Umwelt und Subsistenz der assyrischen Stadt Dūr-Katlimmu am Unteren Ḫābūr.* Wiesbaden: Harrassowitz, 41-52.

KUNIHOLM, P. I., M. W. NEWTON, C. B. GRIGGS & P. J. SULLIVAN 2005. Dendrochronological Dating in Anatolia: The Second Millennium BC. *Der Anschnitt,* 18, 41-47.

KUPPER, J.-R. 1957. *Les Nomades en Mésopotamie au temps des rois de Mari,* Paris, Les Belles Lettres.

--- 1983. *Documents administratifs de la salle 135 du Palais de Mari,* Paris, ERC.

KUZUCUOĞLU, C. 2007. Climatic and Environmental Trends during the Third Millennium B.C. in Upper Mesopotamia. *In:* KUZUCUOĞLU, C. & MARRO, C. (eds.) *Sociétés humaines et changement climatique à la fin du troisième millénaire: une crise a-t-elle eu lieu en Haute Mesopotamie?* Paris: De Boccard, 459-480.

LACAMBRE, D. 2008a. Le bureau de la bière. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 179-220.

--- 2008b. Les mesures de capacités. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 167-177.

--- 2010. L'administration de Chagar Bazar (Ašnakkum) à l'époque de Samsī-Addu. *In:* KOGAN, L., KOSLOVA, N., LOESOV, S. & TISCHENKO, S. (eds.) *City Administration in the Ancient Near East. Proceedings of the 53e Rencontre Assyriologique Internationale Vol. 2.* Winona Lake, IN: Eisenbrauns, 97-114.

LACAMBRE, D. & A. MILLET ALBÀ 2008a. L'entretien de Sîn-iqīšam: Pain et bìere pour un haut fonctionnaire de Samsī-Addu. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 221-238.

--- 2008b. La collection de la taxe-*šibšum.* *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 287-293.

--- 2008c. Ménologie et chronologie. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 155-166.

--- 2008d. Textes administratifs. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 19-122.

LACAMBRE, D. & W. NAHM 2015. Pithana, an Anatolian ruler in the time of Samsuiluna of Babylon: New data from Tell Rimah (Iraq). *Revue d'assyriologie et d'archéologie orientale,* 109**,** 17-28.

LÆSSØE, J. 1959. *The Shemshara Tablets, A Preliminary Report,* København, Royal Danish Academy of Sciences and Letters.

--- 1960. The Second Shemshara Archive. *Sumer,* 16**,** 12-19.

--- 2015 [1963]. *People of Ancient Assyria. Their Inscriptions and Correspondence,* London, Routledge.

LAFONT, B. 2000. Irrigation Agriculture in Mari. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia.* Leiden: Nederlands Instituut voor het Nabije Oosten, 129-146.

LAMBERT, M. 1961. Le premier triomphe de la bureaucratie. *Revue Historique,* 225**,** 21-46.

LANDSBERGER, B. 1949. Jahreszeiten im Sumerisch-Akkadischen. *Journal of Near Eastern Studies,* 8**,** 248-272.

LANGGUT, D. 2015. Prestigious fruit trees in ancient Israel: first palynological evidence for growing *Juglans regia* and *Citrus medica*. *Israel Journal of Plant Sciences,* 62**,** 98-110.

LANGGUT, D., I. FINKELSTEIN, T. LITT, F. H. NEUMANN & M. STEIN 2015. Vegetation and Climate Changes During the Bronze and Iron Ages (~3600-600 BCE) in the Southern Levant Based on Palynological Records. *Radiocarbon,* 57**,** 217-235.

LAPLACA, P. J. & M. A. POWELL 1990. The agricultural cycle and the calendar at Pre-Sargonic Girsu. *Bulletin of Sumerian Agriculture,* 5**,** 65-104.

LAPP, P. W. 1969. The 1968 Excavations at Tell Ta'annek. *Bulletin of American Schools of Oriental Research,* 195**,** 2-49.

LARSEN, C. S. 1999. Dietary Reconstruction and Nutritional Assessment of Past Peoples: The Bioanthropological. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 13-33.

LARSEN, M. T. 2015. *Ancient Kanesh: A Merchant Colony in Bronze Age Anatolia,* Cambridge, Cambridge University Press.

LARSON, G., U. ALBARELLA, K. DOBNEY & P. ROWLEY-CONWY 2007. Current views on *Sus* phylogeography and pig domestication as seen through modern mtDNA studies. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 30-41.

LARSON, G. & J. BURGER 2013. A population genetics view of animal domestication. *Trends in Genetics,* 29**,** 197-205.

LARSON, G., T. CUCCHI & K. DOBNEY 2011. Genetic Aspects of Pig Domestication. *In:* ROTSCHILD, M. F. & RUVINSKY, A. (eds.) *The Genetics of the Pig.* CABI, 14-37.

LATOUR, B. 2005. *Reassembling the social : an introduction to actor-network-theory,* Oxford ; New York, Oxford University Press.

LAUINGER, J. 2005. Epigraphic Finds from the Oriental Institute's 2003 Excavations at Alalakh. *Journal of Near Eastern Studies,* 64**,** 53-58.

---. 2007. *Archival Practices at Old Babylonian/Middle Bronze Age Alalakh (Level VII).* Ph.D., University of Chicago.

--- 2010. Epigraphic Report. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 85-88.

--- 2011. An Excavated Dossier of Cuneiform Tablets from Level VII Alalaḫ. *Bulletin of the American Schools of Oriental Research,* 363**,** 21-64.

--- 2014. Witnessing at Old Babylonian Alalah: A New Level VII Witness List from the Koç University Excavations at Tell Atchana/Alalah. *Revue d'assyriologie et d'archéologie orientale,* 108**,** 25-40.

--- 2015. *Following the Man of Yamhad. Settlement and Territory at Old Babylonian Alalah,* Leiden, Brill.

LAWRENCE, D. 2012. *Early Urbanism in the Northern Fertile Crescent: A Comparison of Regional Settlement Trajectories and Millenial Landscape Change.* Ph.D., Durham University.

LAWRENCE, D., J. BRADBURY & R. DUNFORD 2012. Chronology, Uncertainty and GIS: A Methodology for Characterising and Understanding Landscapes of the Ancient Near East. *In:* BEBERMEIER, W., HEBENSTREIT, R., KAISER, E. & KRAUSE, J. (eds.) *Landscape Archaeology. Proceedings of the International Conference held in Berlin, 6th - 8th June 2012.* Berlin: Excellence Cluster Topoi, 353-359.

LAWRENCE, D., G. PHILIP, K. WILKINSON, J. P. BUYLAERT, A. S. MURRAY, W. THOMPSON & T. J. WILKINSON 2015. Regional power and local ecologies: Accumulated population trends and human impacts in the northern Fertile Crescent. *Quaternary International***,** 1-22.

LAWRENCE, T. E. [1935] 2008. *Seven Pillars of Wisdom,* London, Vintage.

LAYARD, A. H. 1849. *Nineveh and its remains : with an account of a visit to the Chaldæan Christians of Kurdistan, and the Yezidis, or devil-worshippers; and an inquiry into the manners and arts of the ancient Assyrians,* London, John Murray.

LAYARD, A. H. 1853. *Discoveries in the ruins of Nineveh and Babylon : with travels in Armenia, Kurdistan and the desert: being the result of a second expedition undertaken for the trustees of the British Museum,* [S.l.], Murray.

LE STRANGE, G. 1905. *The Lands of the Eastern Caliphate,* Cambridge, Cambridge University Press.

LEACH, H. M. 1982. On the Origins of Kitchen Gardening in the Ancient Near East. *Garden History,* 10**,** 1-16.

LEICK, G. 2015. Too Young - Too Old? Sex and age in Mesopotamian literature. *In:* MASTERSON, M., RABINOWITZ, N. & ROBSON, J. (eds.) *Sex in Antiquity: Exploring Gender and Sexuality in the Ancient World.* London & New York: Routledge, 80-95.

LEV-YADUN, S., A. GOPHER & S. ABBO 2000. The Cradle of Agriculture. *Science,* 288, 1602-1603.

LEVINE, L. D. 1973. Geographical Studies in the Neo-Assyrian Zagros: I. *Iran,* 11, 1-27.

LION, B. 1992. Vignes au royaume de Mari. *Florilegium Marianum,* 1, 107-114.

--- 2006. Les suidés dans la documentation textuelle du Bronze Récent. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 103-114.

LION, B. & C. MICHEL 2000. Poissons et crustacés en haute Mésopotamie au début du IIe millénaire av. J.-C. *Topoi Supplementum,* 2, 71-116.

--- 2006. L'élevage des porcs en haute Mésopotamie, Syrie et Transtigrine au début du II^e millénaire. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 89-101.

LISTER, A. M., W. DIRKS, A. ASSAF, M. CHAZAN, P. GOLDBERG, Y. H. APPLBAUM, N. GREENBAUM & L. K. HORWITZ 2013. New fossil remains of *Elephas* from the southern Levant: Implications for the evolutionary history of the Asian elephant. *Palaeogeography, Palaeoclimatology, Palaeoecology,* 386, 119-130.

LITTAUER, M. A., J. H. CROUWEL & P. STEINKELLER 1990. Ceremonial Threshing in the Ancient Near East. *Iraq,* 52, 15-23.

LIVERANI, M. 1996. Reconstructing the Rural Landscape of the Ancient Near East. *Journal of the Economic and Social History of the Orient,* 39, 1-41.

--- 2005. The Near East: The Bronze Age. *In:* MANNING, J. G. & MORRIS, I. (eds.) *The Ancient Economy: Evidence and Models.* Stanford, CA: Stanford University Press, 47-57.

--- 2013. *The Ancient Near East: History, Society and Economy,* London, Routledge.

LLOYD, S. 1938. Some Ancient Sites in the Sinjar District. *Iraq,* 5, 123-142.

LÓPEZ-BOTE, C. 1998. Sustained Utilization of the Iberian Pig Breed. *Meat Science,* 49, S17-S27.

LORETZ, O. 1969. *Texte aus Chagar Bazar und Tell Brak,* Neukirchen-Vluyn, Verlag Butzon & Bercker Kevelaer.

LUCAS, A. 2006. *Wind, Water, Work: Ancient and Medieval Milling Technology,* Leiden, Brill.

LUFF, R. 1999. Ducks. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 517-522.

LUTZ, H. F. 1922. *Viticulture and Brewing in the Ancient Orient,* Leipzig, J.C. Hinrich.

LYON, J. D. 2000. Middle Assyrian Expansion and Settlement Development in the Syrian Jazira: The View from the Balikh Valley. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia. Proceedings of the Third MOS Symposium (Leiden 1999).* Leiden: Nederlands Instituut vor het Nabije Oosten, 89-126.

LYONNET, B. 1996. La prospection archéologique de la partie occidentale du Haut-Khabur (Syrie du Nord-est): méthodes, résultats et questions autour de l'occupation aux IIIe et IIe millénaires av. N.É. *In:* DURAND, J.-M. (ed.) *Amurru 1. Mari, Ébla et les Hourrites 1.* Paris: ERC, 363-376.

--- 2000a. Objectifs de la Prospection, Méthodologie et Résultats Généraux. *In:* LYONNET, B. (ed.) *Prospection Archéologique Haut-Khabur Occidental (Syrie du N.E.) Vol. I.* Beirut: Institut Français d'Archéologie du Proche-Orient, 5-76.

--- (ed.) 2000b. *Prospection Archéologique Haut-Khabur Occidental (Syrie du N.E.) Vol. I,* Beirut: Institut Français d'Archéologie du Proche-Orient.

LYONNET, B. & X. FAIVRE 2014. The Settlement Pattern of the Western Upper Khabur from the Old Babylonian Period to the End of the Mittani Era. *In:* CANCIK-KIRSCHBAUM, E., BRISCH, N. & EIDEM, J. (eds.) *Constituent, Confederate, and Conquered Space: The Emergence of the Mittani State.* Berlin: de Gruyter, 213-246.

MAEKAWA, K. 1974. Agricultural Production in Ancient Sumer. *Zinbun,* 13**,** 1-60.

--- 1984. Cereal Cultivation in the Ur III Period. *Bulletin of Sumerian Agriculture,* 1**,** 73-96.

--- 1985. Cultivation of Legumes and mun-gazi Plants in Ur III Girsu. *Bulletin of Sumerian Agriculture,* 2**,** 97-118.

--- 1987. The Management of Domain Land in Ur III Umma: A Study of BM 110116. *Zinbun,* 22**,** 25-82.

--- 1999. The Agricultural Texts of Ur III Lagash of the British Museum (XII(*Zinbun,* 34**,** 145-166.

MALLON, D. P. & S. C. KINGSWOOD (eds.) 2001. *Antelopes. Part 4: North Africa, the Middle East, and Asia. Global Survey and Regional Action Plans,* Gland, Switzerland and Cambridge, UK: SSC Antelope Specialist Group, IUCN.

MALLOWAN, M. E. L. 1936. The Excavations at Tall Chagar Bazar, and an Archaeological Survey of the Habur Region, 1934-5. *Iraq,* 3**,** 1-86.

--- 1937. The Excavations at Tall Chagar Bazar and an Archaeological Survey of the Habur Region. Second Campaign, 1936. *Iraq,* 4**,** 91-177.

--- 1946. Excavations in the Baliḫ Valley, 1938. *Iraq,* 8**,** 111-159.

--- 1947. Excavations at Brak and Chagar Bazar. *Iraq,* 9**,** 1-259.

MANN, M. 1984. The autonomous power of the state. *European Journal of Sociology,* XXV**,** 185-213.

--- [1986] 2012. *The Sources of Social Power: Volume 1: A history of power from the beginning to A.D. 1760,* Cambridge, Cambridge University Press.

--- [1993] 2012. *The Sources of Social Power: Volume 2: The Rise of Classes and Nation-States, 1760-1914,* Cambridge, Cambridge University Press.

MANNING, J. G. 2002. Irrigation et État en Égypte Antique. *Annales. Histoire, Sciences Sociales,* 57**,** 611-623.

MANNING, J. G. & I. MORRIS (eds.) 2005. *The Ancient Economy: Evidence and Models,* Stanford, CA: Stanford University Press.

MANNING, S. W., C. B. GRIGGS, B. LORENTZEN, G. BARJAMOVIC, C. BRONK RAMSEY, B. KROMER & E. M. WILD 2016. Integrated Tree-Ring-Radiocarbon High-Resolution Timeframe to Resolve Earlier Second Millennium BCE Mesopotamian Chronology. *PLoS ONE,* 11**,** 1-27.

MANNING, S. W., F. HÖFLMAYER, N. MOELLER, M. W. DEE, C. B. RAMSEY, D. FLEITMANN, T. HIGHAM, W. KUTSCHERA & E. M. WILD 2014. Dating the Thera (Santorini) eruption: archaeological and scientific evidence supporting a high chronology. *Antiquity,* 88**,** 1164-1179.

MARGUERON, J.-C. 2004. *Mari: Métropole de l'Euphrate au IIIe et au début du IIe millénaire av. J.-C.,* Paris, Picard.

--- 2013a. *Cités Invisibles: La naissance de l'urbanisme au Proche-Orient ancien,* Paris, Geuthner.

--- 2013b. The Kingdom of Mari. *In:* CRAWFORD, H. (ed.) *The Sumerian World.* London & New York: Routledge, 517-537.

MARTENS, H. 2008. Zur Faunistik und Ökologie der Amphibien und Reptilen im Gebiet des Naḫr al-Ḫābūr. *In:* KÜHNE, H. (ed.) *Umwelt und Subsistenz der assyrischen Stadt Dūr-Katlimmu am Unteren Ḫābūr.* Wiesbaden: Harrassowitz, 53-57.

MATILLA SÉIQUER, G. & D. RIVERA NÚÑEZ 1994. Estudio Paleoetnobotánico de Tell Qara Qūzāq-I. *In:* DEL OLMO LETE, G. (ed.) *Tell Qara Qūzāq - I: Campañas I-III (1989-1991).* Barcelona: AUSA, 151-182.

MATNEY, T. 2012. Northern Mesopotamia. *In:* POTTS, D. T. (ed.) *A Companion to the Archaeology of the Ancient Near East Vol. I-II.* Oxford & Malden: Blackwell, 556-574.

MATTHEWS, R. 2003. *The Archaeology of Mesopotamia: Theories and Approaches,* London, Routledge.

MATTHIAE, P. 2013. The Royal Palace. Functions of the Quarters and the Government of the *Chora*. *In:* MATTHIAE, P. & MARCHETTI, N. (eds.) *Ebla and Its Landscape: Early State Formation in the Ancient Near East.* Walnut Creek, CA: Left Coast Press, 49-65.

MATTHIAE, P. & N. MARCHETTI (eds.) 2013. *Ebla and its Landscape: Early State Formation in the Ancient Near East,* Walnut Creek, CA: Left Coast Press.

MAZAR, A. & N. PANITZ-COHEN 2007. It is the Land of Honey: Beekeeping in Iron Age IIA Tel Rehov - culture, cult and economy. *Near Eastern Archaeology,* 70**,** 202-219.

MAZAR, A., N. PANITZ-COHEN, R. NEUMANN & S. WEINER 2008. The Iron Age beehives at Tel Rehov in the Jordan Valley: Archaeological and analytical aspects. *Antiquity,* 82**,** 629-639.

MAZOYER, M. & L. ROUDANT 2006. *A History of World Agriculture: From the Neolithic Age to the Current Crisis,* London & Sterling, VA, Earthscan.

MCMAHON, A. (ed.) 2009. *Once There Was A Place: Settlement Archaeology at Chagar Bazar, 1999-2002,* London: British Institute for the Study of Iraq.

--- 2013. North Mesopotamia in the Third Millennium BC. *In:* CRAWFORD, H. (ed.) *The Sumerian World.* London & New York: Routledge, 462-477.

MCMAHON, A., C. COLANTONI & M. SEMPLE 2005. British Excavations at Chagar Bazar, 2001-2. *Iraq,* 67**,** 1-16.

MCMAHON, A., Ö. TUNCA & A. E.-M. BAGHDO 2001. New Excavations at Chagar Bazar, 1999-2000. *Iraq,* 63**,** 201-221.

MEIJER, D. J. W. 1986. *A Survey in Northeastern Syria,* Leiden, Nederlands Instituut voor het Nabije Oosten.

--- 2000. State and Trade: Toward a Case Study for Northern Syria. *Subartu,* VII**,** 219-240.

--- 2014. Marginal and Steppic Areas as Sources for Archaeological Debate: A Case for "Active Symbiosis" of Town and Country. *In:* CANCIK-KIRSCHBAUM, E., BRISCH, N. & EIDEM, J. (eds.) *Constituent, Confederate, and Conquered Space: The Emergence of the Mitanni State.* Berlin: De Gruyter, 163-178.

METAXAS, C. C. 1891. Mémoire sur les animaux de la Mesopotamie. *Revue Sci. Nat. Appliquées, Bull. Soc. Nat. Acclim. France,* 9**,** 321-328.

MICHEL, C. & M.-L. NOSCH (eds.) 2010. *Textile terminologies in the Ancient Near East and Mediterranean from the third to the first millennium BC,* Oxford and Oakville, CT: Oxbow.

MIGLUS, P. A. 2003. Palast. B. Archäologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 233-276.

MIGLUS, P. A. & E. STROMMENGER 2002. *Tall Bi'a/Tuttul VIII: Stadtbefestigungen, Häuser und Tempel,* Saarbrücken, Saarbrücker Druckerei und Verlag.

--- 2007. *Der Palast A,* Wiesbaden, Harrassowitz.

MIGOWSKI, C., M. STEIN, S. PRASAD, J. F. W. NEGENDANK & A. AGNON 2006. Holocene climate variability and cultural evolution in the Near East from the Dead Sea sedimentary record. *Quaternary Research,* 66**,** 421-431.

MILANO, L. 1989. Food and Diet in Pre-Classical Syria. *In:* ZACCAGNINI, C. (ed.) *Production and Consumption in the Ancient Near East.* Budapest: Eötvös Loránd University of Budapest, 201-271.

--- 1993a. Mehl. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 9**,** 22-31.

--- 1993b. Mühle. A. I. In Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 8**,** 393-400.

MILLER, N. F. 2008. Sweeter than wine? The use of the grape in early western Asia. *Antiquity,* 82**,** 937-946.

MILLER, N. F. & D. ENNEKING 2014. Bitter Vetch (Vicia ervilia): Ancient Medicinal Crop and Farmers' Favorite for Feeding Livestock. *In:* MINNIS, P. E. (ed.) *New Lives for Ancient and Extinct Crops.* Tucson, AZ: University of Arizona Press, 254-268.

MILLET ALBÀ, A. 2008. Le harem de Sîn-iqīšam. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 239-282.

MITCHELL, T. 1991. The limits of the state: beyond statist approaches and their critics. *The American Political Science Review,* 85**,** 77-96.

MOORE, A. M. T., G. C. HILLMAN & A. J. LEGGE 2000. *Village on the Euphrates: From Foraging to Farming at Abu Hureyra,* Oxford, Oxford University Press.

MOOREY, P. R. S. 1986. The Emergence of the Light, Horse-Drawn Chariot in the Near East c. 2000-1500 B.C. *World Archaeology,* 18**,** 196-215.

MOOREY, P. R. S. 1994. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence,* Oxford, Clarendon Press.

MORANDI BONACOSSI, D. 2007. The Chronology of the Royal Palace of Qatna Revisited: A Reply to a Paper by Mirko Novák, *Egypt and the Levant* 14, 2004. 221-239.

MORELAND, J. 2001. *Archaeology and Text,* London, Duckworth.

MORI, L. 2007. Land and land use: the middle Euphrates valley. *In:* LEICK, G. (ed.) *The Babylonian World.* Oxford: Routledge, 39-53.

MORLEY, I. & C. RENFREW (eds.) 2010. *The Archaeology of Measurement: Comprehending Heaven, Earth, and Time in Ancient Societies,* Cambridge: Cambridge University Press.

MORRISON, M. A. 1981. Evidence for herdsmen and animal husbandry in the Nuzi documents. *In:* OWEN, D. & MORRISON, M. A. (eds.) *Studies on the Civilization and Culture of Nuzi and the Hurrians in Honor of Ernest R. Lacheman on His Seventy-fifth Birthday.* Winona Lake, IN: Eisenbrauns, 257-296.

MORTENSEN, P. 1970. *Tell Shimshara: The Hassuna Period,* Copenhagen, Royal Danish Academy of Sciences and Letters.

MOSKOF, K. 1979. *Isagogika stin istoria tou kinimatos tis ergatikis taxis: i diamorfosi tis ethnikis kai koinonikis sunidisis stin Ellada,* Thessaloniki, Moskof.

MUDGE, K., J. JANICK, S. SCOFIELD & E. E. GOLDSCHMIDT 2009. A History of Grafting. *Horticultural Reviews,* 35**,** 437-493.

MÜHL, S. 2012. Human Landscape - Site (Trans-) Formation in the Transtigris Area. *In:* HOFMANN, R., MOETZ, F.-K. & MÜLLER, J. (eds.) *Tells: Social and Environmental Space.* Bonn: Verlag Dr. Rudofl Habelt, 79-92.

MUHLY, J. D. 1980. Review of Hawkins, J.D. (1977) *Trade in the Ancient Near East. Journal of the American Oriental Society,* 100**,** 173-175.

MULLINS, R. A. 2010. Comparative Analysis of the Alalakh 2003-2004 Season Pottery with Woolley's Levels. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 51-66.

MURRAY, M. A. 2000. Cereal production and processing. *In:* NICHOLSON, P. T. (ed.) *Ancient Egyptian Materials and Technology.* Cambridge: Cambridge University Press, 505-536.

MURRAY, M. A., N. BOULTON & C. HERON 2000. Viticulture and wine production. *In:* SHAW, I. (ed.) *The Oxford History of Ancient Egypt.* Oxford: Oxford University Press, 577-608.

NADERI, S., H.-R. REZAEI, F. POMPANON, M. G. B. BLUM, R. NEGRINI, H.-R. NAGHASH, Ö. BALKIZ, M. MASHKOUR, O. E. GAGGIOTTI, P. AJMONE-MARSAN, A. KENCE, J.-D. VIGNE & P. TABERLET 2008. The goat domestication process inferred from large-scale mitochondrial DNA analysis of wild and domestic individuals. *Proceedings of the National Academy of Sciences,* 105**,** 17659-17664.

NASHEF, K. 1988. Qaṭṭarā and Karanā. *Die Welt des Orients,* 19**,** 35-39.

NESBITT, M. 2003. Obst und Gemüse (Fruits and Vegetables). B. Archäobotanisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 26-30.

NESBITT, M. & J. N. POSTGATE 2001. Nuss und Verwandtes. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 9**,** 633-635.

NESBITT, M. & D. SAMUEL 1996. From staple crop to extinction? The archaeology and history of hulled wheats. *In:* PADULOSI, S., HAMMER, K. & HELLER, J. (eds.) *Hulled Wheats. Promoting the conservation and use of underutilized and neglected crops.* Rome: IPGRI, 41-100.

NISHIAKI, Y. 1992. Preliminary Results of the Prehistoric Survey in the Khabur Basin, Syria: 1990-91 Seasons. *Paléorient,* 18**,** 97-102.

NORTH, D. C. 1990. *Institutions, Institutional Change and Economic Performance,* Cambridge, Cambridge University Press.

NOSCH, M.-L., Z. FENG & L. VARADARAJAN (eds.) 2014a. *Global Textile Encounters,* Oxford: Oxbow Books.

NOSCH, M.-L., C. MICHEL & M. HARLOW (eds.) 2014b. *Prehistoric, Ancient Near Eastern & Aegean Textiles and Dress: An Interdisciplinary Anthology,* Oxford: Oxbow Books.

NOVAK, M. 2004. The Chronology of the Royal Palace of Qatna. *Ägypten und Levante,* 14**,** 299-317.

O'KEEFE, S. F. 1999. An Overview of Oils and Fats, with a Special Emphasis on Olive Oil. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 375-387.

OATES, D. 1965. The Excavations at Tell al Rimah 1964. *Iraq,* 27**,** 62-80.

--- 1966. The Excavations at Tell al Rimah 1965. *Iraq,* 28**,** 122-139.

--- 1967. The Excavations at Tell al Rimah 1966. *Iraq,* 29**,** 70-96.

--- 1968a. The Excavations at Tell al Rimah 1967. *Iraq,* 30**,** 115-138.

--- 1968b. *Studies in the Ancient History of Northern Iraq,* Oxford, Oxford University Press.

--- 1970. The Excavations at Tell al Rimah 1968. *Iraq,* 32**,** 1-26.

--- 1972. The Excavations at Tell al Rimah 1971. *Iraq,* 34**,** 77-86.

--- 1982. Tell al Rimah. *In:* CURTIS, J. (ed.) *Fifty Years of Mesopotamian Discovery. The work of the British School of Archaeology in Iraq 1932-1982.* London: British School of Archaeology in Iraq, 86-98.

--- 1985. Walled Cities in Northern Mesopotamia in the Mari Period. *MARI. Annales Recherches Interdisciplinaires,* 4**,** 585-594.

OMER, T. M. A. 2011. Country Pasture/Forage Resource Profiles: Iraq. Rome: FAO.

OPPENHEIM, A. L. 1964. *Ancient Mesopotamia. Portrait of a Dead Civilization,* Chicago & London, Chicago University Press.

OTTO, A. 2009. Historische Geographie im Gebiet des Mittleren Euphrats zwischen Karkemiš und Tuttul zur Mittleren und Späten Bronzezeit. *In:* CANCIK-KIRSCHBAUM, E. & ZIEGLER, N. (eds.) *Entre les fleuves - 1: Untersuchungen zur historischen Geographie Obermesopotamiens im 2. Jahrtausend v. Chr.* Gladbeck: PeWe-Verlag, 167-179.

--- 2012. Defining and Transgressing the Boundaries between Ritual Commensality and Daily Commensal Practices: the Case of Late Bronze Age Tall Bazi. *In:* POLLOCK, S. (ed.) *Between Feasts and Daily Meals: Toward and Archaeology of Commensal Spaces.* Berlin: Topoi, 179-194.

OUTRAM, A. K., N. A. STEAR, R. BENDREY, S. OLSEN, A. KASPAROV, V. ZAIBERT, N. THORPE & R. P. EVERSHED 2009. The Earliest Horse Harnessing and Milking. *Science,* 323**,** 1332-1335.

ÖZGÜÇ, N. 1953. Preliminary Report on the 1951 Excavations at Kültepe. *Belleten,* 17**,** 298-306.

PADGHAM, K. 2014. *The Scale and Nature of the Late Bronze Age Economies of Egypt and Cyprus,* Oxford, Archaeopress.

PAGE, S. 1968. The Tablets from Tell Al-Rimah 1967: A Preliminary Report. *Iraq,* 30**,** 87-97.

PALMER, C. 1994. *Reconstructing and Interpreting Ancient Crop Management Practices: Ethnobotanical Investigations into Traditional Dryland Farming in Northern Jordan.* Ph.D., University of Sheffield.

--- 1998. 'Following the plough': the Agricultural Environment of Northern Jordan. *Levant,* 30**,** 129-165.

--- 2001. Traditional Agriculture. *In:* MACDONALD, B., ADAMS, R. & BIENKOWSKI, P. (eds.) *The Archaeology of Jordan.* Sheffield: Sheffield Academic Press, 621-629.

PALMISANO, A. 2015. Geopolitical Patterns and Connectivity in the Upper Khabur Valley in the Middle Bronze Age. *Tradition and Innovation in the Ancient Near East: Proceedings of the 57th Rencontre Assyriologique Internationale at Rome, 4-8 July 2011.* Winona Lake, IN: Eisenbrauns, 369-380.

PALMISANO, A. & M. ALTAWEEL 2015. Landscapes of interaction and conflict in the Middle Bronze Age: From the open plain of the Khabur Triangle to the mountainous inland of Central Anatolia. *Journal of Archaeological Science: Reports,* 3**,** 216-236.

PARAYRE, D. 2000. Les Suidés dans le Monde Syro-Mésopotamien aux Époques Historiques. *Topoi Supplementum,* 2**,** 141-206.

PARKER, B. 1975. Cylinder Seals from Tell al Rimah. *Iraq,* 37**,** 21-38.

PASSMORE, R., B. M. NICOL & M. NARAYANA RAO 1974. *Handbook of Human Nutritional Requirements,* Rome, Food and Agriculture Organization of the United Nations.

PAUKETAT, T. R. 2001. Practice and history in archaeology: An emerging paradigm. *Anthropological Theory,* 1**,** 73-98.

PAULETTE, T. 2013. Consumption and Storage in the Bronze Age. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes.* Oxford: Archaeopress, 102-111.

---. 2015. *Grain Storage and the Moral Economy in Mesopotamia (3000-2000 BC).* Ph.D., University of Chicago.

PEDERSÉN, O. 1998. *Archives and Libraries in the Ancient Near East, 1500-300 BC,* Bethesda, MD, CBL Press.

PEÑA-CHOCARRO, L. & L. ZAPATA 2014. Parching and Dehusking Hulled Wheats. *In:* VAN GIJN, A., WHITTAKER, J. & ANDERSON, P. C. (eds.) *Exploring and Explaining Diversity in Agricultural Technology.* Oxford & Philadelphia: Oxbow Books, 226-232.

PEUST, C. 2000. Über ägyptische Lexikographie. *Lingua Aegyptia,* 7**,** 254-260.

PHILIP, G., D. N. M. DONOGHUE, A. BECK & N. GALIATSATOS 2002. Corona satellite photography: an archaeological application from the Middle East. *Antiquity,* 76**,** 109-118.

PITTMAN, H. 2002. Bears at Brak. *In:* WERR, L. A.-G., CURTIS, J., MARTIN, H., MCMAHON, A., OATES, J. & READE, J. (eds.) *Of Pots and Plans: Papers on the Archaeology and History of Mesopotamia and Syria Presented to David Oates in Honour of his 75th Birthday.* London: NABU, 287-296.

PODANY, A. H. 2002. *The Land of Hana. Kings, Chronology, and Scribal Tradition,* Bethesda, MD, CDL Press.

--- 2014. Hana and the Low Chronology. *Journal of Near Eastern Studies,* 73**,** 49-71.

POLANYI, K. 1977. *The Livelihood of Man,* New York, NY, Academic Press.

POLANYI, K., C. M. ARENSBERG & H. W. PEARSON 1957. *Trade and Market in the Early Empires,* Glencoe, IL, The Free Press.

POLLOCK, S. 1999. *Ancient Mesopotamia: the Eden that Never Was,* Cambridge, Cambridge University Press.

--- 2003. Feasts, Funerals, and Fast Food in Early Mesopotamian States. *In:* BRAY, T. L. (ed.) *The Archaeology and Politics of Food and Feasting in Early States and Empires.* Springer, 17-38.

--- 2012. Politics of Food in Early Mesopotamian Centralized Societies. *Origini,* 34**,** 153-168.

PORTER, B. A. 2013. *Complex Communities: The Archaeology of Early Iron Age West-Central Jordan,* Tucson, AZ, University of Arizona Press.

POSTGATE, C., D. OATES & J. OATES 1997. *The Excavations at Tell al Rimah: The Pottery,* London, British School of Archaeology in Iraq.

POSTGATE, J. N. 1975. Some Old Babylonian Shepherds and Their Flocks. *Journal of Semitic Studies,* 20**,** 1-21.

--- 1978. An Inscribed Jar from Tell al Rimah. *Iraq,* 40**,** 71-75.

--- 1984a. The problem of yields in Sumerian texts. *Bulletin of Sumerian Agriculture,* 1**,** 97-102.

--- 1984b. Processing of cereals in the cuneiform record. *Bulletin of Sumerian Agriculture,* 1**,** 103-113.

--- 1985. The "Oil-Plant" in Assyria. *Bulletin of Sumerian Agriculture,* 2**,** 145-152.

--- 1986. The Equids of Sumer, Again. *In:* MEADOW, R. H. & UERPMANN, H.-P. (eds.) *Equids in the Ancient World Vol. 1.* Wiesbaden: Ludwig Reichert, 194-206.

--- 1987a. Notes on Fruit in the Cuneiform Sources. *Bulletin of Sumerian Agriculture,* 3**,** 115-144.

--- 1987b. Some Vegetables in the Assyrian Sources. *Bulletin of Sumerian Agriculture,* 3**,** 93-100.

--- 1988. *The Archive of Urad-Šerūa and his Family: A Middle Assyrian Household in Government Service*.

--- 1990. Archaeology and the texts—bridging the gap. *Zeitschrift für Assyriologie und Vorderasiatische Archäologie,* 80**,** 228-240.

--- 1994. *Early Mesopotamia: Society and Economy at the Dawn of History,* London, Routledge.

--- 2001. Business and Government at Middle Assyrian Rimah. *In:* WERR, L. A.-G., CURTIS, J., MARTIN, H., MCMAHON, A., OATES, J. & READE, J. (eds.) *Of Pots and Plans: Papers on the Archaeology and History of Mesopotamia and Syria Presented to David Oates in Honour of his 75th Birthday.* London: NABU, 297-308.

--- 2003. Palast. Einleitung. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 196-200.

--- 2009a. Schaf (sheep). A. In Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 12**,** 115-120.

--- 2009b. Schaf (sheep). A. In Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 12**,** 115-120.

--- 2013. *Bronze Age Bureaucracy: Writing and the Practice of Government in Assyria,* Cambridge, Cambridge University Press.

POTTS, D. T. 1984. On Salt and Salt Gathering in Ancient Mesopotamia. *Journal of the Economic and Social History of the Orient,* 27**,** 225-271.

--- 1994. Contributions to the agrarian history of Eastern Arabia I. Implements and cultivation techniques. *Arabian archaeology and epigraphy,* 5**,** 158-168.

--- 1997. *Mesopotamian civilization: the material foundations,* London, Athlone.

--- 2012. Fish and Fishing. *In:* POTTS, D. T. (ed.) *A Companion to the Archaeology of the Ancient Near East.* London: Blackwell, 220-235.

POWELL, M. A. 1977. Sumerian Merchants and the Problem of Profit. *Iraq,* 39**,** 23-29.

--- 1978. Götter, Könige, und 'Kapitalisten' im Mesopotamien des 3. Jahrtausends v.u.Z. *Oikumene,* 2**,** 127-144.

--- 1984a. Late Babylonian Surface Mensuration. *Archiv für Orientforschung,* 31**,** 32-66.

--- 1984b. Sumerian cereal crops. *Bulletin of Sumerian Agriculture,* 1**,** 48-72.

--- 1985. Salt, seed, and yields in Sumerian agriculture: a critique of the theory of progressive salinization. *Zeitschrift f'ur Assyriologie,* 75**,** 7-38.

--- 1987. Classical Sources and the Problem of the Apricot. *Bulletin of Sumerian Agriculture,* 3.

--- 1990. Maße und Gewichte. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 7**,** 457-530.

--- 1991. Epistemology and Sumerian Agriculture: The Strange Case of Sesame and Linseed. *Aula Orientalis,* 9**,** 155-165.

--- 1994. Metron Ariston: Measure as a Tool for Studying Beer in Ancient Mesopotamia. *In:* MILANO, L. (ed.) *Drinking in Ancient Societies.* Padova: Sargon, 91-119.

--- 1995. Wine and the Vine in Ancient Mesopotamia: The Cuneiform Evidence. *In:* MCGOVERN, P. E., FLEMING, S. J. & KATZ, S. H. (eds.) *The Origins and Ancient History of Wine.* Luxembourg: Gordon & Breach, 97-122.

--- 1999a. The Sumerian Agriculture Group: A Brief History. *In:* KLENGEL, H. & RENGER, J. (eds.) *Landwirtschaft im Alten Orient.* Berlin: Dietrich Reimer, 11-15.

--- 1999b. Wir müssen alle unsere Nische nutzen: Monies, Motives, and Methods in Babylonian Economics. *In:* DERCKSEN, J. G. (ed.) *Trade and Finance in Ancient Mesopotamia. Proceedings of the First MOS Symposium (Leiden 1997).* Leiden: Nederlands Historisch-Archaeologisch Instituut te Istanbul, 5-24.

--- 2003. Obst und Gemüse. A. I. Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 13-22.

PRENTICE, R. 2010. *The Exchange of Goods and Services in Pre-Sargonic Lagash,* Münster, Ugarit-Verlag.

PRUZSINSZKY, R. 2009. *Mesopotamian Chronology of the 2nd Millennium B.C. An Introduction to the Textual Evidence and Related Chronological Issues,* Vienna, Österreichischer Akademie der Wissenschaften.

PULHAN, G. 2000. *On the Eve of the Dark Age: Qarni-Lim's Palace at Tell Leilan.* Ph.D., Yale University.

QUENET, P. 2011. Stratigraphy. *In:* LEBEAU, M. (ed.) *Associated Regional Chronologies for the Ancient Near East and the Eastern Mediterranean: Jezirah.* Turnhout: Brepols, 19-48.

RADNER, K. 1997. *Die neuassyrischen Privatrechtsurkunden als Quelle für Mensch und Umwelt,* Helsinki, The Neo-Assyrian Text Corpus Project.

RATTENBORG, R. 2012. *State of Affairs: An investigation of the concepts of state administration in Old Babylonian Mesoptamia.* MA, Copenhagen.

--- 2016. On cereal crops in the Middle Bronze Age Jazīrah and the meaning of *burrum. N.A.B.U. Nouvelles Assyriologiques Brèves et Utilitaires,* 2016**,** 67-70.

--- in press. Land of Behemoths: re-casting political territories of the Middle Bronze Age Jazīrah. *In:* LAWRENCE, D., ALTAWEEL, M. & PHILIP, G. (eds.) *New Agendas in Remote Sensing and Landscape Archaeology in the Near East: Studies in Honor of Tony J. Wilkinson.* Chicago, IL: The Oriental Institute of the University of Chicago,

READE, J. 1968. Tell Taya (1967): Summary Report. *Iraq,* 30**,** 234-264.

--- 1973. Tell Taya (1972-73): Summary Report. *Iraq,* 35**,** 155-187.

--- 1982. Tell Taya. *In:* CURTIS, J. (ed.) *Fifty Years of Mesopotamian Discovery.* London: The British School of Archaeology in Iraq, 72-78.

RECULEAU, H. 2011. *Climate, Environment, and Agriculture in Assyria in the 2nd Half of the 2nd Millennium BCE,* Wiesbaden, Harrassowitz.

RENFREW, C. & P. BAHN 2012. *Archaeology: Theories, Methods and Practice,* London, Thames & Hudson.

RENFREW, J. M. 1985a. Finds of Sesame and Linseed in Ancient Iraq. *Bulletin of Sumerian Agriculture,* 2.

--- 1985b. Pulses Recorded from Ancient Iraq. *Bulletin of Sumerian Agriculture,* 2**,** 67-72.

--- 1987. A Note on Vegetables from Ancient Iraq: The Palaeoethnobotanical Finds. *Bulletin of Sumerian Agriculture,* 3**,** 162.

RENGER, J. 1990. Report on the Implications of Employing Draught Animals. *Bulletin of Sumerian Agriculture,* 5**,** 267-279.

--- 1991. Wirtschaft und Gesellschaft. Die natürlichen Grundlagen der Landwirtschaft. *In:* HROUDA, B. (ed.) *Der Alte Orient. Geschichte und Kultur des alten Vorderasien.* Munich: Bertelsmann, 187-215.

--- 1995. Institutional, Communal, and Individual Ownership or Possession of Arable Land in Ancient Mesopotamia from the End of the Fourth to the End of the First Millennium BC. *Chicago-Kent Law Review,* 71**,** 269-319.

--- 2000. Das Palastgeschäft in der altbabylonischen Zeit. *In:* BONGENAAR, A. C. V. M. (ed.) *Interdependency of institutions and private entrepreneurs. Proceedings of the Second MOS Symposium (Leiden 1998).* Leiden: NINO, 153-183.

--- 2003. Palastwirtschaft. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 276-280.

--- 2007. Economy of ancient Mesopotamia: a general outline. *In:* LEICK, G. (ed.) *The Babylonian World.* Oxford: Routledge, 187-197.

REYNOLDS, F. 2007. Food and drink in Babylonia. *In:* LEICK, G. (ed.) *The Babylonian World.* New York & London: Routledge, 171-186.

RICHARDSON, S. 2007. The World of Babylonian Countrysides. *In:* LEICK, G. (ed.) *The Babylonian World.* Oxford: Routledge, 13-38.

RICHTER, T. & S. LANGE 2012. *Das Archiv des Idadda. Die Keilschrifttexte aus den deutsch-syrischen Ausgrabungen 2001-2003 im Königspalast von Qaṭna,* Wiesbaden, Harrassowitz.

RIEHL, S. 2000. Erste Ergebnisse der archäobotanischen Untersuchungen am Tall Mozan/Urkeš. *Mitteilungen der Deutschen Orient-Gesellschaft,* 132**,** 229-238.

--- 2010. Plant Production in a Changing Environment: The Archaeobotanical Remains from Tell Mozan. *In:* DECKERS, K., DOLL, M., PFÄLZNER, P. & RIEHL, S. (eds.) *The Development of the Environment, Subsistence and Settlement of the City of Urkeš and its Region.* Wiesbaden: Harrassowitz, 13-158.

--- 2012. Variability in ancient Near Eastern environmental and agricultural development. *Journal of Arid Environments,* 86**,** 113-121.

RIEHL, S., K. PUSTOVOYTOV, A. DORNAUER & W. SALLABERGER 2012. Mid-to-Late Holocene Agricultural System Transformation in the Northern Fertile Crescent: A Review of the Archaeobotanical, Geoarchaeological, and Philological Evidence.

RIEHL, S., K. PUSTOVOYTOV, H. WEIPPERT, S. KLETT & F. HOLE 2014. Drought stress variability in ancient Near Eastern agricultural systems evidenced in $\delta^{13}C$ in barley grain. *Proceedings of the National Academy of Sciences,* 111**,** 12348-12353.

RISTVET, L. 2005. *Settlement, Economy, and Society in the Tell Leilan Region, Syria, 3000-1000 BC.* Ph.D., Kings College, University of Cambridge.

--- 2007. The Third Millennium City Wall at Tell Leilan, Syria: Identity, Authority, and Urbanism. *In:* BREITSCHNEIDER, J., DRIESSEN, J. & VAN LERBERGHE, K. (eds.) *Power and Architecture: Monumental Public Architecture in the Bronze Age Near East and Aegean.* Leuven: Peeters, 183-212.

--- 2008. Legal and archaeological territories of the second millennium BC in northern Mesopotamia. *Antiquity,* 82**,** 585-599.

--- 2012. Resettling Apum: Tribalism and Tribal States in the Tell Leilan Region, Syria. *In:* LANERI, N., PFÄLZNER, P. & VALENTINI, S. (eds.) *Looking North: The Socioeconomic Dynamics of the Northern Mesopotamian and Anatolian Regions during the Late Third and Early Second Millennium BC.* Wiesbaden: Harrassowitz, 37-50.

RISTVET, L. & H. WEISS 2011. Archaeological Introduction. *In:* EIDEM, J. (ed.) *The Royal Archives from Tell Leilan: Old Babylonian Letters and Treaties from the Lower Town Palace East.* Leiden: Nederlands Instituut voor het Nabije Oosten, xvii-lii.

--- 2012. Šubat-Enlil. B. Archäologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 13**,** 229-236.

--- 2013. The Ḫābūr Region in the Old Babylonian Period. *In:* ORTHMANN, W., MATTHIAE, P. & AL-MAQDISSI, M. (eds.) *Archéologie et Histoire de la Syrie I: La Syrie de l'époque néolithique à l'âge du fer.* Wiesbaden: Harrassowitz, 257-272.

ROBB, J. & T. R. PAUKETAT (eds.) 2013. *Big Histories, Human Lives: Tackling Problems of Scale in Archaeology*: School for Advanced Research Press.

ROBERTS, N., W. J. EASTWOOD, C. KUZUCUOĞLU, G. FIORENTINO & V. CARACUTA 2011. Climatic, vegetation and cultural change in the eastern Mediterranean during the mid-Holocene environmental transition. *The Holocene,* 21**,** 147-162.

RODBERTUS, K. 1865. Zur Geschichte der römischen Tributsteuern seit Augustus. *Jahrbücher für Nationalökonomie und Statistik,* 4.

ROE, K. D. 2005. *Arranging and describing archives and manuscripts,* Chicago, Society of American Archivists.

RÖLLIG, W. 1970. *Das Bier im Alten Mesopotamien,* Berlin, Gesellschaft für die Geschichte und Bibliographie des Brauwesens.

--- 2008. *Land- und Viehwirtschaft am Unteren Habur in mittelassyrischer Zeit,* Wiesbaden, Harrassoitz Verlag.

ROSELLÓ IZQUIERDO, E. & A. MORALES MUÑIZ 2001. Fish Offerings from Tell Brak? Comments on an Articulated Specimen found in the 1990 Season. *In:* OATES, D., OATES, J. & MCDONALD, H. (eds.) *Excavations at Tell Brak Vol. 2: Nagar in the third millennium BC.* London: Britisch School of Archaeology in Iraq, 339-345.

ROSSEL, S., F. MARSHALL, J. PETERS, T. PILGRAM, M. D. ADAMS & D. O'CONNOR 2008. Domestication of the donkey: Timing, processes, and indicators. *Proceedings of the National Academy of Sciences,* 105**,** 3715-3720.

ROTH, M. T. 1997. *Law Collections from Mesopotamia and Asia Minor,* Atlanta, GA, Scholars Press.

ROUTLEDGE, B. 2014. *Archaeology and State Theory. Subjects and Objects of Power*, Duckworth.

RUNGE, C. F. 1992. Common Property and Collective Action in Economic Development. *In:* BROMLEY, D. W. (ed.) *Making the Commons Work. Theory, Practice, and Policy.* San Francisco, CA: ICS Press, 17-40.

RUSSELL, K. W. 1988. *After Eden: The Behavioral Ecology of Early Food Production in the Near East and North Africa,* Oxford.

RUTTNER, F. 1988. *Biogeography and Taxonomy of Honeybees,* Berlin, Springer-Verlag.

RUVINSKY, A., M. F. ROTSCHILD, G. LARSON & J. GONGORA 2011. Systematics and Evolution of the Pig. *In:* ROTSCHILD, M. F. & RUVINSKY, A. (eds.) *The Genetics of the Pig.* CABI, 1-13.

RYDER, M. L. 1983. *Sheep & Man,* London, Duckworth.

--- 1993. Sheep and goat husbandry with particular reference to textile fibre and milk production. *Bulletin of Sumerian Agriculture,* 7**,** 9-32.

SABATO, D., C. ESTERAS, O. GRILLO, B. PICÓ & G. BACCHETTA 2015. Seeds morpho-colourimetric analysis as complementary method to molecular characterization of melon diversity. *Scientia Horticulturae,* 192**,** 441-452.

SAGGS, H. W. F. 1968. The Tell al Rimah Tablets, 1965. *Iraq,* 30**,** 154-174.

SALLABERGER, W. 2007. From Urban Culture to Nomadism: A History of Upper Mesopotamia in the Late Third Millenium. *In:* KUZUCUOGLU, C. & MARRO, C. (eds.) *Sociétés Humaines et Changement Climatique à la Fin du Troisième Millénaire: Une Crise a-t-elle eu lieu en Haute Mésopotamie? .* Lyon: De Boccard, 417-456.

--- 2012. Home-made Bread, Municipal Mutton, Royal Wine. Establishing Social Relations during the Preparation and Consumption of Food in Religious Festivals at Late Bronze Age Emar. *In:* POLLOCK, S. (ed.) *Between Feasts and Daily Meals: Toward an Archaeology of Commensal Spaces.* Berlin: Excellence Cluster Topoi, 157-177.

SALLABERGER, W. & A. PRUS 2015. Home and Work in Early Bronze Age Mesopotamia: "Ration Lists" and "Private Houses" at Tell Beydar/Nabada. *In:* STEINKELLER, P. & HUDSON, M. (eds.) *Labor in the Ancient World.* Dresden: ISLET-Verlag, 69-136.

SALMAN, S. D., M. H. ALI & A. H. Y. AL-ADHUB 1990. Abundance and seasonal migrations of the penaeid shrimp *Metapenaeus affinis* (H. Milne-Edwards) within Iraqi waters. *Hydrobiologia,* 196**,** 79-90.

SALONEN, A. 1968. *Agricultura Mesopotamica nach Sumerisch-Akkadischen Quellen: Eine lexikalische und kulturgeschichtliche Untersuchung,* Helsinki, Suomalainen Tiedeakatemia.

SAMUEL, D. 1993. Ancient Egyptian Cereal Processing: Beyond the Artistic Record. *Cambridge Archaeological Journal,* 3**,** 276-283.

--- 2000. Brewing and baking. *In:* NICHOLSON, P. T. & SHAW, I. (eds.) *Ancient Egyptian Materials and Technology.* Cambridge: Cambridge University Press, 537-576.

--- 2009. Experimental Grinding and Ancient Egyptian Flour Production. *In:* IKRAM, S. & DODSON, A. (eds.) *Beyond the Horizon: Studies in Egyptian Art,* *Archaeology and History in Honour of Barry J. Kemp.* Cairo: Supreme Council of Antiquities, 456-477.

SANATI-MÜLLER, S. 1989. Texte aus dem Sînkāšid-Palast. *Baghdader Mitteilungen,* 20, 225-315.

SANLAVILLE, P. 1990. Milieu naturel et irrigation. *In:* GEYER, B. (ed.) *Techniques et pratiques hydro-agricoles traditionelles en domaine irrigué.* Damascus, 3-19.

SANMARTÍN, J. 1993. Sheep and goats in the Akkadian economic texts from Ugarit. *Bulletin of Sumerian Agriculture,* 7, 199-207.

SASSMANNSHAUSEN, L. 2001. Administrative texts as a source for historiography. *In:* ABUSCH, T., BEAULIEU, P.-A. & HUEHNERGARD, J. (eds.) *Historiography in the Cuneiform World Part I. Proceedings of the XLVe Rencontre Assyriologique Internationale.* Bethesda, MD: CDL Press, 441-453.

SASSON, J. M. 1972. Some Comments on Archive Keeping at Mari. *Iraq,* 34, 55-67.

--- 2004. The King's Table: Food and Fealty in Old Babylonian Mari. *In:* GROTTANELLI, C. & MILANO, L. (eds.) *Food and Identity in the Ancient World.* Padua: S.A.R.G.O.N, 179-216.

--- 2015. *From the Mari Archives: An Anthology of Old Babylonian Letters,* Winona Lake, IN, Eisenbrauns.

SAUVAGE, M. 1995. Le context archéologique et la fin des archives a Khirbet ed-Diniyé - Harâdum. *Revue d'assyriologie et d'archéologie orientale,* 89, 41-55.

SCHEIDEL, W. 2013. Studying the State. *In:* SCHEIDEL, W. & BANG, P. F. (eds.) *The Oxford handbook of the state in the Ancient Near East and Mediterranean.* Oxford & New York: Oxford University Press, 5-57.

SCHLOEN, J. D. 2001. *The House of the Father as Fact and Symbol. Patrimonialism in Ugarit and The Ancient Near East,* Winona Lake, Ind., Eisenbrauns.

SCHLUMBAUM, A. & P. VANDORPE 2012. A short history of *Lagenaria siceraria* (bottle gourd) in the Roman provinces: morphotypes and archaeogenetics. *Vegetation History and Archaeobotany,* 21, 499-509.

SCHMIDT, S. 2015. *Late Chalcolithic to Early Bronze Age Settlement Patterns in the Greater Western Jazira: Trajectories of Sedentism in the Semi-Arid Syrian Steppe.* Ph.D., Durham University.

SCHNEIDER, A. 1920. *Die Anfänge der Kulturwirtschaft. Die Sumerische Tempelstadt,* Essen, Baedeker.

SCHORTMAN, E. M. 2014. Networks of Power in Archaeology. *Annual Review of Anthropology,* 43, 167-182.

SCHORTMAN, E. M. & W. ASHMORE 2012. History, networks, and the quest for power: ancient political competition in the Lower Motagua Valley, Guatemala. *Journal of the Royal Anthropological Institute,* 18, 1-21.

SCHORTMAN, E. M. & P. A. URBAN 2012. Enacting power through networks. *Journal of Anthropological Archaeology,* 31, 500-514.

SCHOU, T. P. 2015. *Mobile pastoralist groups and the Palmyrene in the late Early to Middle Bronze Age (c. 2400-1700 BCE).* Ph.D., University of Bergen.

SCHROEDER, R. 2006. Introduction: the IEMP model and its critics. *In:* HALL, J. A. & SCHROEDER, R. (eds.) *An Anatomy of Power: The Social Theory of Michael Mann.* Cambridge: Cambridge University Press, 1-16.

SCHWARTZ, G. M. 1994. Rural economic specialization and early urbanization in the Khabur valley, Syria. *In:* SCHWARTZ, G. M. & FALCONER, S. (eds.) *Archaeological Views from the Countryside: Village Communities in Early Complex Societies.* Washington: Smithsonian Institution Press, 19-36.

SCHWARTZ, G. M., H. H. CURVERS, F. A. GERRITSEN, J. A. MACCORMACK, N. F. MILLER & J. WEBER 2000. Excavation and Survey in the Jabbul Plain, Western Syria: The Umm el-Marra Project 1996-1997. *American Journal of Archaeology,* 104**,** 419-462.

SEBASTIAN, P., H. SCHAEFER, I. R. H. TELFORD & S. S. RENNER 2010. Cucumber (*Cucumis sativus*) and melon (*C. melo*) have numerous wild relatives in Asia and Australia, and the sister species of melon is from Australia. *Proceedings of the National Academy of Sciences,* 107**,** 14269-14273.

SEIDL, U. 2003. Pflug. B. Archäeologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 10**,** 514-516.

SERI, A. 2005. *Local Power in Old Babylonian Mesopotamia,* London, Equinox.

SERPICO, M. & R. WHITE 2000. Oil, fat and wax. *In:* NICHOLSON, P. T. & SHAW, I. (eds.) *Ancient Egyptian Materials and Technology.* Cambridge: Cambridge University Press, 390-429.

SHACKELFORD, L., F. MARSHALL & J. PETERS 2013. Identifying donkey domestication through changes in cross-sectional geometry of long bones. *Journal of Archaeological Science,* 40.

SHIMELMITZ, R. & S. ZUCKERMAN 2014. Flint Knapping in the Late Bronze Age: A Dying Technology? A Perspective from the Lower City of Hazor. *Levant,* 46**,** 43-57.

SILLITOE, P. 2007. Pigs in the New Guinea Highlands: an ethnographic example. *In:* ALBARELLA, U., DOBNEY, K., ERVYNCK, A. & ROWLEY-CONWY, P. (eds.) *Pigs and Humans: 10,000 Years of Interaction.* Oxford: Oxford University Press, 331-356.

SIMON, Z. 2014. Remarks on the Anatolian Background of the Tel Reḥov Bees and the Historical Geography of the Luwian States in the 10th c. BC. *In:* CSABAI, Z. (ed.) *Studies in Economic and Social History of the Ancient Near East in Memory of Péter Vargyas.* Budapest: University of Pécs, 715-738.

SISSAKIAN, V. K. 2011. Genesis and Age Estimation of the Tharthar Depression, Central West Iraq. *Iraqi Bulletin of Geology and Mining,* 7**,** 47-62.

SKULDBØL, T. B. B. & C. COLANTONI 2014. Damage Assessment of Iraq's Past: Archaeological Heritage Management on the Rania Plain, Iraqi Kurdistan. *Middle East - Topics & Arguments,* 3**,** 41-54.

SMITH, A. 2012. Akkadian and post-Akkadian Plant Use at Tell Leilan. *In:* WEISS, H. (ed.) *Seven Generations Since the Fall of Akkad.* Wiesbaden: Harrassowitz, 225-240.

SMITH, A. T. 2003. *The Political Landscape: Constellations of Authority in Early Complex Societies,* Berkeley, CA, University of California Press.

SMITH, M. E. 2004. The Archaeology of Ancient State Economies. *Annual Review of Anthropology,* 33, 73-102.

SMITH, M. L. 2007. Territories, Corridors, and Networks: A Biological Model for the Premodern State. *Complexity,* 12, 28-35.

--- 2008. Networks, Territories, and the Cartography of Ancient States. *Annals of the Association of American Geographers,* 95, 832-849.

--- 2014. The Archaeology of Urban Landscapes. *Annual Review of Anthropology,* 43.

SMITH, S. 1939. A Preliminary Account of the Tablets from Atchana. *The Antiquaries Journal,* 19, 38-48.

SNELL, D. C. 1983. The Old Babylonian Cuneiform Texts from Chagar Bazar in the Aleppo Museum. *Annales Archéologiques Arabes Syriennes,* 33, 217-241.

--- 1997. *Life in the Ancient Near East, 3100-332 B.C.E.,* New Haven & London, Yale University Press.

SOLTYSIAK, A. 2009. Human bones from Chagar Bazar: scientific analyses. *In:* MCMAHON, A. (ed.) *Once There Was A Place: Settlement Archaeology at Chagar Bazar, 1999-2002.* London: British Institute for the Study of Iraq, 129-159.

SOUBEYRAN, D. 1984. Textes N °428 à 534. *In:* BARDET, G., JOANNÈS, F., LAFONT, B., SOUBEYRAN, D. & VILLARD, P. (eds.) *Archives Royales de Mari XXIII: Archives Administratives de Mari I.* Paris: ERC, 327-452.

SPAR, I. & E. VON DASSOW 2000. *Corpus of Cuneiform Texts in the Metropolitan Museum of Art III: Private Archive Texts from the First Millennium BC,* New York, Metropolitan Museum of Art.

STAUBWASSER, M. & H. WEISS 2006. Holocene climate and cultural evolution in late prehistoric–early historic West Asia. *Quaternary Research,* 66, 372-387.

STEIN, D. L. 1997. Alalakh. *In:* MEYERS, E. M. (ed.) *The Oxford Encyclopedia of Archaeology in the Near East.* New York & Oxford: Oxford University Press.

STEIN, G. 1998. Heterogeneity, Power, and Political Economy: Some Current Research Issues in the Archaeology of Old World Complex Societies. *Journal of Archaeological Research,* 6, 1-44.

--- 1999. *Rethinking World-Systems. Diasporas, Colonies, and Interaction in Uruk Mesopotamia,* Tucson, AZ, The University of Arizona Press.

--- 2009. Tell Zeidan. *In:* STEIN, G. (ed.) *The Oriental Institute Annual Report.* Chicago, IL: The Oriental Institute of the University of Chicago.

--- 2010. *The Oriental Institute Annual Report.* Chicago, IL: The Oriental Institute of the University of Chicago.

--- 2014. Economic Dominance, Conquest, or Interaction among Equals? Theoretical Models for Understanding Culture Contact in Early Near Eastern Complex Societies. *In:* KHARANAGHI, M. H. A., KHANIPOUR, M. & NASERI, R. (eds.) *Proceedings of the International Congress of Young Archaeologists.* Tehran: University of Tehran Press, 51-64.

STEIN, G. & P. WATTENMAKER 1990. The 1987 Tell Leilan Regional Survey: Preliminary Report. *In:* MILLER, N. F. (ed.) *Economy and Settlement in the Near East: Analyses of Ancient Sites and Materials.* Philadelphia, PA: MASCA, 8-19.

STEIN, G. J. 2012. The Development of Indigenous Social Complexity in Late Chalcolithic Upper Mesopotamia in the 5th - 4th Millennia BC - An Initial Assessment. *Origini,* XXXIV**,** 125-151.

STEINKELLER, P. 1995. Sheep and goat terminology in Ur III sources from Drehem. *Bulletin of Sumerian Agriculture,* 8**,** 49-70.

--- 2004. The Function of Written Documentation in the Administrative Praxis of Early Babylonia. *In:* HUDSON, M. & WUNSCH, C. (eds.) *Creating Economic Order: Record-Keeping, Standardization, and the Development of Accounting in the Ancient Near East.* Bethesda, ML: CDL, 65-88.

STEPIEN, M. 1996. *Animal husbandry in the ancient Near East: A prosopographic study of third-millennium Umma,* Bethesda, ML, CDL Press.

STEVENS, L. R., H. E. WRIGHT & E. ITO 2001. Proposed changes in seasonality of climate during the Lateglacial and Holocene at Lake Zeribar, Iran. *The Holocene,* 11**,** 747-755.

STEWARD, J. H. 1977. Wittfogel's Irrigation Hypothesis. *In:* STEWARD, J. C. & MURPHY, R. F. (eds.) *Evolution and Ecology.* Urbana, IL: University of Illinois Press, 87-99.

STINER, M. C., H. BUITENHUIS, G. DURU, S. L. KUHN, S. M. MENTZER, N. D. MUNRO, N. PÖLLATH, J. QUADE, G. TSARTSIDOU & M. ÖZBAŞARAN 2014. A forager-herder trade-off, from broad-spectrum hunting to sheep management at Aşıklı Höyük, Turkey. *Proceedings of the National Academy of Sciences,* 111**,** 8404-8409.

STOIANOVICH, T. 1976. *French Historical Method. The Annales Paradigm,* Ithaca & London, Cornell University Press.

STOL, M. 1971. Zur Altmesopotamischen Bierbereitung. *Bibliotheca Orientalis,* 28**,** 167-171.

--- 1979. *On trees, mountains and millstones in the Ancient Near East,* Leiden, Ex Oriente Lux.

--- 1985a. Beans, Peas, Lentils and Vetches in Akkadian Texts. *Bulletin of Sumerian Agriculture,* 2**,** 127-139.

--- 1985b. Remarks on the Cultivation of Sesame and the Extraction of its Oil. *Bulletin of Sumerian Agriculture,* 2**,** 119-126.

--- 1987. Garlic, onion, leek. *Bulletin of Sumerian Agriculture,* 3**,** 57-80.

--- 1989. Malz. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 7**,** 322-329.

--- 1993a. Milch(produkte). A. In Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 8**,** 189-201.

--- 1993b. Milk, Butter, and Cheese. *Bulletin of Sumerian Agriculture,* 7**,** 99-113.

--- 1994. Beer in Neo-Babylonian Times. *In:* MILANO, L. (ed.) *Drinking in Ancient Societies.* Padova: Sargon, 155-183.

--- 1995. Old Babylonian cattle. *Bulletin of Sumerian Agriculture,* 8**,** 173-213.

--- 2004. Wirtschaft und Gesellschaft in Altbabylonischer Zeit. *In:* ATTINGER, P., SALLABERGER, W. & WÄFLER, M. (eds.) *Mesopotamien. Die altbabylonische Zeit.* Freiburg & Göttingen: Academic Press/Vandenhoeck & Ruprecht, 641-975.

--- 2008. Ration. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 11, 264-269.

--- 2012. Strauß. A. Philologisch. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 13, 211-212.

STONE, E. & B. J. KEMP 2003. Review of *The House of the Father as Fact and Symbol: Patrimonialism in Ugarit and the Ancient Near East*, by J. David Schloen, 2001. (Studies in the Archaeology and History of the Levant 2) Cambridge (MA): Eisenbrauns. *Cambridge Archaeological Journal,* 13, 121-128.

STOUT, B. A. 1990. *Handbook of Energy for World Agriculture,* London & New York, Elsevier Science.

STRAND, E. A. & M.-L. NOSCH (eds.) 2014. *Tools, Textiles and Contexts: Textile Production in the Aegean and Eastern Mediterranean Bronze Age*: Oxbow Books.

STRAUB, R. 1988. *Vorderer Orient. Böden 1:8000000. Karte A II 6*. Wiesbaden: Ludwig Reichert Verlag.

STRECK, M. P. 2010. Großes Fach Altorientalistik: Der Umfang des keilschriftlichen Textkorpus. *Mitteilungen der Deutschen Orient-Gesellschaft,* 142, 35-58.

STROMMENGER, E. 1981. Die archäologischen Forschungen in Tall Bi'a 1980. *Mitteilungen der Deutschen Orient-Gesellschaft,* 113, 23-34.

STROMMENGER, E., S. BÖHME, M. A. BRANDES, C. HEMKER, K. KOHLMEYER, W. LUDWIG, H. SCHULZE-WISCHELER & G. SELZ 1989. Ausgrabungen in Tall Bi'a 1987. *Mitteilungen der Deutschen Orient-Gesellschaft,* 121, 5-64.

SUMNER, W. 1990. Full Coverage Regional Archaeological Survey in the Near East: An Example from Iran. *In:* FISH, S. K. & KOWALEWSKI, S. A. (eds.) *The Archaeology of Regions: A Case for Full-Coverage Survey.* Washington D.C.: Smithsonian Institution Press, 87-115.

SUTTIE, J. M., S. G. REYNOLDS & C. BATELLO (eds.) 2005. *Grasslands of the World,* Rome: FAO.

SWEDBERG, R. 2005. *The Max Weber dictionary: Key words and central concepts*, Stanford University Press.

TALON, P. 1997. *Old Babylonian Texts from Chagar Bazar,* Brussels, Foundation Assyriologique Georges Dossin.

TANNO, K.-I. & G. WILLCOX 2006. The origins of cultivation of *Cicer arietinum* L. and *Vicia faba* L.: early finds from Tell el-Kerkh, north-west Syria, late 10th millennium B.P. *Vegetation History and Archaeobotany,* 15, 197-204.

TANRET, M. 2010. IAP VI/34 Greater Mesopotamia: Reconstruction of its Environment and History. Report 2007-2010.

TAPPER, R. 1990. Anthropologists, Historians, and Tribespeople on Tribe and State Formation in the Middle East. *In:* KHOURY, P. S. & KOSTINER, J. (eds.) *Tribes and State Formation in the Middle East.* Berkeley, CA: University of California Press,

TENGBERG, M. 2012. Fruit-Growing. *In:* POTTS, D. (ed.) *A Companion to the Archaeology of the Ancient Near East Vol. I-II.* Oxford: Blackwell, 181-200.

TENNEY, J. S. 2011. *Life at the Bottom of Babylonian Society: Servile Laborers at Nippur in the 14th and 13th Centuries B.C.,* Leiden & Boston, Brill.

THE BOVINE HAPMAP CONSORTIUM 2009. Genome-Wide Survey of SNP Variation Uncovers the Genetic Structure of Cattle Breeds. *Science,* 324.5926, 528-532.

TRIGGER, B. 1967. Settlement Archaeology. Its Goals and Promise. *American Antiquity,* 32, 149-160.

--- 2003. *Understanding Early Civilizations: A Comparative Study,* Cambridge, Cambridge University Press.

--- 2007. *A History of Archaeological Thought. Second edition.,* Cambridge, Cambridge University Press.

TROY, C. S., D. E. MACHUGH, J. F. BAILEY, D. A. MAGEE, R. T. LOFTUS, P. CUNNINGHAM, A. CHAMBERLAIN, B. C. SYKES & D. G. BRADLEY 2001. Genetic evidence for Near-Eastern origins of European cattle. *Nature,* 410, 1088-1091.

TUBEROSO, C. I. G., E. BIFULCO, I. JERKOVIĆ, P. CABONI, P. CABRAS & I. FLORIS 2009. Methyl Syringate: A Chemical Marker of Asphodel (*Asphodelus microcarpus* Salzm. et Vic.) Monofloral Honey. *Journal of Agricultural and Food Chemistry,* 57, 3895-3900.

TUNCA, Ö. 2008. Présentation et context archéologique des tablettes et des scellements. *In:* TUNCA, Ö. & BAGHDO, A. E.-M. (eds.) *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002).* Leuven: Peeters, 3-14.

TUNCA, Ö. & A. E.-M. BAGHDO (eds.) 2008. *Chagar Bazar (Syrie) III. Les trouvailles épigraphiques et sigillographiques du chantier I (2000-2002),* Leuven: Peeters.

TUNCA, Ö., A. E.-M. BAGHDO & W. CRUELLS (eds.) 2006. *Chaga Bazar (Syrie) I: Les sondages préhistoriques (1999-2001),* Leuven: Peeters.

TUNCA, Ö., A. MCMAHON & A. E.-M. BAGHDO (eds.) 2007. *Chagar Bazar (Syrie) II: Les vestiges "post-akkadiens" du chantier D et études diverses,* Leuven: Peeters.

UR, J. A. 2003. CORONA satellite photography and ancient road networks: a Northern Mesopotamian case study. *Antiquity,* 77, 102-115.

--- 2010a. Cycles of Civilization in Northern Mesopotamia, 4400-2000 BC. *Journal of Archaeological Research,* 18, 387-431.

--- 2010b. *Urbanism and Cultural Landscapes in Northeastern Syria: The Tell Hamoukar Survey, 1999-2001,* Chicago, IL, The Oriental Institute of the University of Chicago.

--- 2014. Households and the Emergence of Cities in Ancient Mesopotamia. *Cambridge Archaeological Journal,* 24, 249-268.

--- 2015. Urban Adaptations to Climate Change in Northern Mesopotamia. *In:* KERNER, S., DANN, R. J. & BANGSGAARD, P. (eds.) *Climate and Ancient Societies.* Copenhagen: Museum Tusculanum Press, 69-96.

UR, J. A., L. DE JONG, J. GIRAUD, J. F. OSBORNE & J. MACGINNIS 2013. Ancient Cities and Landscapes in the Kurdistan Region of Iraq: The Erbil Plain Archaeological Survey 2012 Season. *Iraq,* 75, 89-117.

UR, J. A. & T. J. WILKINSON 2008. Settlement and Economic Landscapes of Tell Beydar and its Hinterland. *Subartu,* 21, 305-327.

VAISEY-GENSER, M. & D. H. MORRIS 2003. Introduction: history of the cultivation and uses of flaxseed. *In:* MUIR, A. D. & WESTCOTT, N. D. (eds.) *Flax: The genus Linum.* Boca Raton, FL: CRC Press,

VAN DE MIEROOP, M. 1987. *Crafts in the Early Isin Period: A Study of the Isin Craft Archive from the Reigns of Išbi-Erra and Šū-Ilišu,* Leuven, Peeters Publishers.

--- 1992. *Society and Enterprise in Old Babylonian Ur,* Berlin, Dietrich Reimer Verlag.

--- 1993. Sheep and goat herding according to the Old Babylonian texts from Ur. *Bulletin of Sumerian Agriculture,* 7**,** 161-182.

--- 1994. The Tell Leilan Tablets 1991: A Preliminary Report. *Orientalia,* 27**,** 305-344.

--- 1997. *The Ancient Mesopotamian City,* Oxford, Oxford University Press.

--- 1999. *Cuneiform texts and the writing of history,* London, Routledge.

--- 2000. An Accountant's Nightmare: the Drafting of a Year's Summary. *Archiv für Orientforschung,* 46/47**,** 111-129.

--- 2004. Economic Theories and the Ancient Near East. *In:* ROLLINGER, R. & ULF, C. (eds.) *Commerce and Monetary Systems in the Ancient World: Means of Transmission and Cultural Interaction.* Wiesbaden: Franz Steiner Verlag, 54-64.

--- 2007. *A History of the Ancient Near East, ca. 3000-323 BC,* Malden, MA ; Oxford, Blackwell.

--- 2013. Recent Trends in the Study of Ancient Near Eastern History: Some Reflections. *Journal of Ancient History,* 1**,** 83-98.

VAN DRIEL, G. 1995. Cattle in the Neo-Babylonian period. *Bulletin of Sumerian Agriculture,* 8**,** 215-240.

--- 2000a. The Mesopotamian North: Land Use, An Attempt. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia.* Leiden: Nederlands Instituut voor het Nabije Oosten, 265-299.

--- 2000b. The Size of Institutional Umma. *Archiv für Orientforschung,* 46/47**,** 80-91.

--- 2001. On villages. *In:* VAN SOLDT, W. H. (ed.) *Veenhof Anniversary Volume: Studies presented to Klaas R. Veenhof on the occasion of his sixty-fifth birthday.* Leiden: Nederlands Instituut voor het Nabije Oosten, 103-118.

VAN KOPPEN, F. 2000. Review of Talon, P. (1997) *Old Babylonian Texts from Chagar Bazar*. *Archiv für Orientforschung,* 46**,** 336-341.

--- 2001. The Organisation of Institutional Agriculture in Mari. *Journal of the Economic and Social History of the Orient,* 44**,** 451-504.

--- 2002. Seized by royal order: the households of Sammêtar and other magnates at Mari. *In:* CHARPIN, D. & DURAND, J.-M. (eds.) *Recueil d'études à la mémoire d'André Parrot.* Paris: SEPOA, 289-372.

--- 2006. Pigs in Lower Mesopotamia during the Old Babylonian Period (2000-1600 BC). *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 181-194.

VAN LOON, M. 1967. *The Tabqa Reservoir Survey 1964,* Damascus, Direction Generale des Antiquites et des Musees.

VAN LOON, M. & D. J. W. MEIJER 1988. Foreword. *In:* VAN LOON, M. (ed.) *Hammam et-Turkman I.* Istanbul: Netherlands Historical and Archaeological Institute, xxv-xxix.

VAN OOSTEROM, E. J., S. CECCARELLI & J. M. PEACOCK 1993. Yield response of barley to rainfall and temperature in Mediterranean environments. *Journal of Agricultural Science,* 121**,** 307-313.

VAN ZEIST, W. 1984. Palaeobotanical Investigations of Tell ed-Dēr. *In:* DE MEYER, L. (ed.) *Tell ed-Dēr IV.* Leuven: Peeters, 119-134.

--- 1985. Pulses and Oil Crop Plants. *Bulletin of Sumerian Agriculture,* 2**,** 33-37.

--- 1994. Some notes on second millennium BC plant cultivation in the Syrian Jazira. *In:* GASCHE, H. & TANRET, M. (eds.) *Cinquante-deux reflexions sur le Proche-Orient offertes en hommage à Léon de Meyer.* Leuven: Peeters, 541-553.

--- 1999. Evidence for agricultural change in the Balikh Basin, northern Syria. *In:* GOSDEN, C. & HATHER, J. (eds.) *Prehistory of Food: Appetite for Change.* London and New York: Routledge, 350-373.

--- 1999/2000. Third to first millennium BC plant cultivation on the Khabur, north-eastern Syria. *Palaeohistoria,* 41/42**,** 111-126.

--- 2001. Third to first millennium BC plant cultivation on the Khabur, north-eastern Syria. *Palaeohistoria,* 41-42**,** 111-125.

VAN ZEIST, W. & J. BAKKER-HEERES 1985. Archaeobotanical Studies in the Levant 4: Bronze Age Sites on the North Syrian Euphrates. *Palaeohistoria,* 27**,** 247-316.

VAN ZEIST, W. & S. BOTTEMA 1999. Plant Cultivation in Ancient Mesopotamia: The Palynological and Archaeological Approach. *In:* KLENGEL, H. & RENGER, J. (eds.) *Landwirtschaft im Alten Orient.* Berlin: Dietrich Reimer, 25-41.

VAN ZEIST, W. & W. H. 1980. Holocene vegetation and climate of northwestern Syria. *Palaeohistoria,* 22**,** 111-125.

VANVALKENBURGH, P. & J. F. OSBORNE 2012. Home Turf: Archaeology, Territoriality, and Politics. *Archeological Papers of the American Anthropological Association,* 22**,** 1-27.

VEENHOF, K. R. 1972. *Aspects of Old Assyrian Trade and its Terminology,* Leiden.

--- (ed.) 1986. *Cuneiform Archives and Libraries. Papers read at the 30 Rencontre Assyriologique Internationale, Leiden 4-8 July 1983,* Leiden: Nederlands Instituut voor het Nabije Oosten.

--- 2008. The Old Assyrian Period. *In:* WÄFLER, M. (ed.) *Mesopotamia. The Old Assyrian Period.* Fribourg & Göttingen: Academic Press/Vandenhoeck & Ruprecht, 13-266.

VELDHUIS, N. 2004. *Religion, Literature, and Scholarship: The Sumerian Composition Nanše and the Birds,* Leiden & Boston, Brill.

--- 2006. How to Classify Pigs: Old Babylonian and Middle Babylonian Lexical Texts. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, VERNON, K. 1999. Milk and Dairy Products. *In:* KIPLE, K. F. & ORNELAS, K. C. (eds.) *The Cambridge World History of Food.* Cambridge: Cambridge University Press, 692-701.

VIGNE, J.-D., A. ZAZZO, J.-F. SALIÈGE, F. POPLIN, J. GUILAINE & A. SIMMONS 2009. Pre-Neolithic wild boar management and introduction to Cyprus more than 11,400 years ago. *Proceedings of the National Academy of Sciences,* 106, 16135-16138.

VILA, E. 2006. Données archézoologiques sur les suidés de la période Halaf à l'Âge du Fer. *In:* LION, B. & MICHEL, C. (eds.) *De la domestication au tabou: Le cas des suidés au Proche-Orient ancient.* Paris: De Boccard, 137-153.

VILLARD, P. 1987. Un conflit d'autorités à propos des eaux du Balikh. *MARI,* 5, 591-596.

--- 2001. Les administrateurs de l'époque de Yasmah-Addu. *In:* DURAND, J.-M. & CHARPIN, D. (eds.) *Amurru 2: Mari, Ébla et les Hourittes. Dix ans de travaux. Actes de colloque international (Paris, mai 1993).* Paris: ERC, 9-132.

VINCENTE, C. A. 1991. *The 1987 Tell Leilan tablets dated by the limmu of Habil-kinu.* Ph.D., Yale University.

--- 1995. The Tall Leilān Recension of the Sumerian King List. *Zeitschrift f'ur Assyriologie,* 85, 234-270.

VOLK, K. 1999. Imkerei im Alten Mesopotamien. *In:* KLENGEL, H. & RENGER, J. (eds.) *Landwirtschaft im Alten Orient.* Berlin: Dietrich Reimer Verlag, 279-290.

VOLLEMAERE, B. 2016. Ṣubâtum, le nom ancien de Tell Taya à l'époque amorrite. *N.A.B.U. Nouvelles Assyriologiques Brèves et Utilitaires,* 2016, 15-17.

VON DASSOW, E. 2008. *State and Society in the Late Bronze Age Alalaḫ under the Mitanni Empire,* Bethesda, ML, CDL Press.

VON DER OSTEN-SACKEN, E. 1999. Vögel beim Pflügen. *In:* KLENGEL, H. & RENGER, J. (eds.) *Landwirtschaft im Alten Orient.* Berlin: Dietrich Reimer Verlag, 265-278.

--- 2015. *Untersuchungen zur Geflügelwirtschaft im Alten Orient,* Freiburg and Göttingen, Academic Press and Vandenhoek & Ruprecht.

WACHTER-SARKADY, C. 2013. Consuming Plants. Archaeobotanical Samples from Royal Palace G and Building P4. *In:* MATTHIAE, P. & MARCHETTI, N. (eds.) *Ebla and its Landscape: Early State Formation in the Ancient Near East.* Walnut Creek, CA: Left Coast Press, 376-402.

WAETZOLDT, H. 1985. Ölpflanzen und Pflanzenöle im 3. Jahrtausend. *Bulletin of Sumerian Agriculture,* 2, 77-96.

--- 1987a. Compensation of craft workers and officials in the Ur III period. *In:* POWELL, M. A. (ed.) *Labor in the Ancient Near East.* Winona Lake, IN: Eisenbrauns, 117-141.

--- 1987b. Knoblauch und Zwiebeln nach den Texten des 3. Jt. *Bulletin of Sumerian Agriculture,* 3, 23-56.

--- 2008. Rind. A. In mesopotamischen Quellen des 3. Jahrtausends. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 11, 375-388.

WAGSTAFF, J. M. 1985. *The Evolution of Middle Eastern Landscapes,* London, Croom Helm.

WALLERSTEIN, I. 1974. *The Modern World-System Vol. I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century,* New York & London, Academic Press.

WARBURTON, D. 1997. *State and Economy in Ancient Egypt: Fiscal Vocabulary of the New Kingdom,* Fribourg & Göttingen, Vandenhoeck & Ruprecht.

--- 2009. Economics, Anthropological Models and the Ancient Near East. *Anthropology of the Middle East,* 4**,** 65-90.

WASSERMAN, N. 1999. Eqlam naṣārum: Pests and Pest Prevention in Old-Babylonian Sources. *In:* KLENGEL, H. & RENGER, J. (eds.) *Landwirtschaft im Alten Orient.* Berlin: Dietrich Reimer, 341-354.

WASYLIKOWA, K. & R. KOLIŃSKI 2013. The role of plants in the economy of Tell Arbid, north-east Syria, in the Post-Akkadian Period and Middle Bronze Age. *Acta Palaeobotanica,* 53**,** 263-293.

WATSON, P. J. 1979. *Archaeological Ethnography in Western Iran,* Tucson, AZ, University of Arizona Press.

WEBER, J. 2008. Elite equids: redefining equid burials of the mid- to late 3rd millennium BC from Umm el-Marra, Syria. *Archaeozoology of the Near East VIII.* Lyon: Maison de l'Orient et de la Méditerranée, 499-519.

WEBER, M. 1978. *Economy and society : an outline of interpretive sociology,* Berkeley, University of California Press.

--- [1909] 1976. *The Agrarian Sociology of Ancient Civilizations,* London, NLB.

WEISS, H. 1982. Tall Lēlan. *Archiv für Orientforschung,* 28**,** 226-229.

--- 1986. The Origin of Tell Leilan and the Conquest of Space in Third Millennium Mesopotamia. *In:* WEISS, H. (ed.) *The Origin of Cities in Dry-Farming Syria and Mesopotamia in the Third Millennium B.C.* Guilford, CT: Four Quarters, 71-108.

--- 1990. Tell Leilan 1989: New Data for Mid-Third Millennium Urbanization and State Formation. *Mitteilungen der Deutschen Orient-Gesellschaft,* 122**,** 193-218.

--- 2013. Tell Leilan and the Dynamics of Social and Environmental Force across the Mesopotamian Dry-Farming Landscape. *In:* BONATZ, D. & MARTIN, L. (eds.) *100 Jahre archäologische Feldforschungen in Nordost-Syrien - eine Bilanz.* Wiesbaden: Harrassowitz, 101-116.

WEISS, H., P. M. M. G. AKKERMANS, G. J. STEIN, D. PARAYRE & R. WHITING 1990. 1985 Excavations at Tell Leilan, Syria. *American Journal of Archaeology,* 94**,** 529-581.

WESZELI, M. 2008. Rind. B. In mesopotamischen Quellen des 2. und 1. Jahrtausends. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 11**,** 388-406.

--- 2009. Schwein. A. In Mesopotamien. *Reallexikon der Assyriologie und vorderasiatischen Archäologie,* 12**,** 319-329.

WHALLON, R. 1978. Threshing sledge flints: a distinctive pattern of wear. *Paléorient,* 4**,** 319-324.

WHITE, K. D. 1970. *Roman Farming,* London, Thames & Hudson.

WHITING, R. M. 1990. Tell Leilan/Šubat-Enlil. Chronological Problems and Perspectives. *In:* WÄFLER, M. (ed.) *Tall al-Ḫamīdīya 2.* Fribourg & Göttingen: Academic Press/Vandenhoeck & Ruprecht, 167-218.

WHITTAKER, J. 2003. Threshing sledges and threshing floors in Cyprus. *In:* ANDERSON, P. C., CUMMINGS, L. S., SCHIPPERS, T. K. & SIMONEL, B. (eds.) *Le Traitement des Récoltes: Un regard sur la diversité, du Néolithique au Présent. XXIII rencontres internationales d'archéologi et d'histoire d'Antibes.* Antibes: Éditions APDCA, 375-387.

WHO & FAO 2004. Human energy requirements. Report of a Joint FAO/WHO/UNU Expert Consultation, Rome, 17-24 October 2001. *Food and Nutrition Technical Report Series.*

WICK, L., G. LEMCKE & M. STURM 2003. Evidence of Lateglacial and Holocene climatic change and human impact in eastern Anatolia: high-resolution pollen, charcoal, isotopic and geochemical records from the laminated sediments of Lake Van, Turkey. *The Holocene,* 13**,** 665-675.

WIDELL, M. 2003. Some observations on the administration, agriculture and animal management of Tell Beydar. *Ugarit-Forschungen,* 35**,** 717-734.

WIDELL, M., C. HRITZ, J. A. UR & T. J. WILKINSON 2013a. Land Use of the Model Communities. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes: How small-scale processes contributed to the growth of early civilizations.* Oxford: Archaeopress, 56-80.

WIDELL, M., B. STUDEVENT-HICKMAN, J. TENNEY, J. LAUINGER, D. MAHONEY & T. PAULETTE 2013b. Staple Production, Cultivation and Sedentary Life: Model Input Data. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes.* Oxford: Archaeopress, 81-101.

WIGGERMANN, F. A. M. 2000. Agriculture in the Northern Balikh Valley: The Case of Middle Assyrian Tell Sabi Abyad. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia. Proceedings of the Third MOS Symposium (Leiden 1999).* Leiden: Nederlands Instituut vor het Nabije Oosten, 171-232.

WILKINSON, T. J. 1994. The structure and dynamics of dry-farming states in Upper Mesopotamia. *Current Anthropology,* 35**,** 483-520.

--- 1997. The history of the Lake of Antioch: a preliminary note. *In:* YOUNG, G. D., CHAVALAS, M. W., AVERBECK, R. E. & DANTI, K. L. (eds.) *Crossing Boundaries and Linking Horizons: Studies in Honor of Michael C. Astour on His 80th Birthday.* Bethesda, ML: CDL Press, 557-576.

--- 1998. Water and Human Settlement in the Balikh Valley, Syria: Investigations from 1992-1995. *Journal of Field Archaeology,* 25**,** 63-87.

--- 2000a. Archaeological survey of the Tell Beydar region, Syria, 1997: A preliminary report. *In:* VAN LERBERGHE, K. & VOET, G. (eds.) *Tell Beydar: Environmental and Technical Studies.* Turnhout: Brepols, 1-37.

--- 2000b. Regional Approaches to Mesopotamian Archaeology: The Contribution of Archaeological Surveys. *Journal of Archaeological Research,* 8**,** 219-267.

--- 2000c. Settlement and Land Use in the Zone of Uncertainty in Upper Mesopotamia. *In:* JAS, R. M. (ed.) *Rainfall and Agriculture in Northern Mesopotamia.* Leiden: Nederlands Instituut voor het Nabije Oosten, 3-36.

--- 2002. The Settlement Transition of the Second Millennium BC in the Western Khabur. *In:* WERR, L. A.-G., CURTIS, J., MARTIN, H., MCMAHON, A., OATES, J. & READE, J. (eds.) *Of Pots and Plans: Papers on the Archaeology and History of Mesopotamia and Syria Presented to David Oates in Honour of his 75th Birthday.* London: NABU, 361-372.

--- 2003. *Archaeological Landscapes of the Near East,* Tucson, University of Arizona Press.

--- 2004. *On the Margin of the Euphrates: Settlement and Land Use at Tell es-Sweyhat and in the Upper Lake Assad Area, Syria,* Chicago, IL.

--- 2012. Introduction to Geography, Climate, Topography, and Hydrology. *In:* POTTS, D. T. (ed.) *A Companion to the Archaeology of the Ancient Near East Vol. I-II.* Oxford: Blackwell, 3-26.

--- 2013. Wetland Archaeology and the Role of Marshes in the Ancient Near East. *In:* MENOTTI, F. & O'SULLIVAN, A. (eds.) *The Oxford Handbook of Wetland Archaeology.* Oxford: Oxford University Press, 121-140.

WILKINSON, T. J., J. CHRISTIANSEN, M. ALTAWEEL & M. WIDELL 2013a. Output from the Agent-Based Modeling Program. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes: How small-scale processes contributed to the growth of early civilizations.* Oxford: Archaeopress, 177-203.

WILKINSON, T. J. & E. CUNLIFFE 2012. The Archaeological Landscape of the Tell Beydar Region: An Update Using Satellite Imagery. *In:* BOIY, T., BRETSCHNEIDER, J., GODDEERIS, A., HAMEEUW, H., JANS, G. & TAVERNIER, J. (eds.) *The Ancient Near East, A Life!* Leuven: Peeters, 665.

WILKINSON, T. J., M. GIBSON & M. WIDELL (eds.) 2013b. *Models of Mesopotamian Landscapes: How small-scale processes contributed to the growth of early civilizations,* Oxford: Archaeopress.

WILKINSON, T. J. & C. HRITZ 2013. Physical Geography, Environmental Change, and the Role of Water. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes: How small-scale processes contributed to the growth of early civilizations.* Oxford: Archaeopress, 9-33.

WILKINSON, T. J., G. PHILIP, J. BRADBURY, R. DUNFORD, D. DONOGHUE, N. GALIATSATOS, D. LAWRENCE, A. RICCI & S. L. SMITH 2014. Contextualizing Early Urbanization: Settlement Cores, Early States and Agro-pastoral Strategies in the Fertile Crescent During the Fourth and Third Millennia BC. *Journal of World Prehistory,* 27**,** 43-109.

WILKINSON, T. J., J. A. UR & J. CASANA 2004. From Nucleation to Dispersal: Trends in Settlement Pattern in the Northern Fertile Crescent. *In:* CHERRY, J. & ALCOCK, S. (eds.) *Side-by-Side Survey: Comparative Regional Studies in the Mediterranean World.* Oxford: Oxbow, 198-205.

WILKINSON, T. J., J. A. UR & C. HRITZ 2013c. Settlement Archaeology of Mesopotamia. *In:* WILKINSON, T. J., GIBSON, M. & WIDELL, M. (eds.) *Models of Mesopotamian Landscapes: How small-scale processes contributed to the growth of early civilizations.* Oxford: Archaeopress, 34-55.

WIRTH, E. 1971. *Syrien. Eine Geographische Landeskunde,* Darmstadt, Wissenschaftliche Buchgesellschaft.

WISEMAN, D. J. 1953. *The Alalakh Tablets,* London, British Institute of Archaeology at Ankara.

--- 1954. Supplementary Copies of Alalakh Tablets. *Journal of Cuneiform Studies,* 8**,** 1-30.

WISEMAN, D. J. 1958. Abban and Alalaḫ. *Journal of Cuneiform Studies,* 12**,** 124-129.

WITTFOGEL, K. A. 1957. *Oriental Despotism. A comparative study of total power,* New Haven & London, Yale University Press.

WOOLLEY, C. L. 1938. Excavations at Tal Atchana, 1937. *The Antiquaries Journal,* 18**,** 1-28.

--- 1939. Excavations at Atchana-Alalakh, 1938. *The Antiquaries Journal,* 19**,** 1-37.

--- 1948. Excavations at Atchana-Alalakh, 1939. *The Antiquaries Journal,* 28**,** 1-19.

--- 1950. Excavations at Atchana-Alalakh, 1946. *The Antiquaries Journal,* 30**,** 1-21.

--- 1953. *A Forgotten Kingdom: Being a Record of the Results Obtained from the Excavation of Two Mounds, Atchana and Al Mina, in the Turkish Hatay,* London, Pelican Books.

--- 1955. *An Account of the Excavations at Tell Atchana in the Hatay, 1937-1949,* Oxford, The Society of Antiquaries.

WOSSINK, A. 2009. *Challenging Climate Change: Competition and cooperation among pastoralists and agriculturalists in northern Mesopotamia (c. 3000-1600 BC),* Leiden, Sidestone Press.

WRIGHT, H. T. & G. A. JOHNSON 1975. Population, Exchange, and Early State Formation in Southwestern Iran. *American Anthropologist,* 77**,** 267-289.

WU, Y. 1992. Yarkab-Addu, the king of Šubat-Šamaš. *N.A.B.U. Nouvelles Assyriologiques Brèves et Utilitaires,* 1992**,** 50-51.

--- 1994. *A political history of Eshnunna, Mari and Assyria during the early Old Babylonian Period (from the end of Ur III to the death of Šamši-Adad),* Changchun, Institute of History of Ancient Civilizations.

XENOPHON 1972. *The Persian Expedition,* Harmondsworth, Penguin Books.

YAMADA, M. 2011. The second military conflict between 'Assyria' and 'Ḫatti' in the reign of Tukulti-Ninurta I. *Revue d'assyriologie et d'archéologie orientale,* 105**,** 199-220.

YAMAMOTO, S. 1979. The 'Agricultural Year' in Pre-Sargonic Girsu-Lagash. *Acta Sumerologica,* 1**,** 85-97.

--- 1980. The 'Agricultural Year' in Pre-Sargonic Lagash (II). *Acta Sumerologica,* 2**,** 169-187.

YASUDA, Y., H. KITAGAWA & T. NAKAGAWA 2000. The earliest record of major anthropogenic deforestation in the Ghab Valley, northwest Syria: a palynological study. *Quaternary International,* 73/74**,** 127-136.

YENER, K. A. 2005a. Alalakh Spatial Organization. *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 99-144.

--- 2005b. The Amuq Valley Regional Projects. *In:* YENER, K. A. (ed.) *The Amuq Valley Regional Projects Vol. 1: Surveys in the Plain of Antioch and Orontes Delta, Turkey, 1995-2002.* Chicago, IL: The Oriental Institute of the University of Chicago, 1-24.

--- 2007. The Anatolian Middle Bronze Age kingdoms and Alalakh: Mukish, Kanesh and trade. *Anatolian Studies,* 57**,** 151-160.

--- 2010. Introduction. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 1-10.

---. 2015. *The Excavations at Alalakh (Tell Atchana)* [Online]. Available: http://www.alalakh.org/intro.asp [Accessed 27 August 2016].

YENER, K. A., C. EDENS, T. P. HARRISON, J. VERSTRAETE & T. J. WILKINSON 2000. The Amuq Valley Regional Project, 1995-1998. *American Journal of Archaeology,* 104**,** 163-220.

YENER, K. A. & G. B. YAZICIOĞLU 2010. Excavation Results. *In:* YENER, K. A. (ed.) *Tell Atchana, Ancient Alalakh Vol. 1: The 2003-2004 Excavation Seasons.* Istanbul: Koç University Press, 11-50.

YOFFEE, N. 1977. *The Economic Role of the Crown in the Old Babylonian Period,* Malibu, CA, Undena Publications.

--- 1981. *Explaining Trade in Ancient Western Asia,* Malibu, CA, Undena.

--- 1995. Political economy in early Mesopotamian states. *Annual Review of Anthropology,* 24**,** 281-311.

--- 2004. *Myths of the Archaic State: Evolution of the Earliest Cities, States, and Civilizations,* Cambridge, Cambridge University Press.

ZACCAGNINI, C. 1975. The Yields of the Fields at Nuzi. *Oriens Antiquus,* 14**,** 181-225.

--- 1979. *The Rural Landscape of the Land of Arrapḫe,* Rome, Università di Roma - Instituto di Studi del Vicino Oriente.

--- 1981. A Note on Nuzi Textiles. *In:* MORRISON, M. A. & OWEN, D. (eds.) *Studies on the Civilization and Culture of Nuzi and the Hurrians in Honor of Ernest R. Lacheman on His Seventy-fifth Birthday.* Winona Lake, IN: Eisenbrauns, 349-362.

--- 1983. Patterns of Mobility among Ancient near Eastern Craftsmen. *Journal of Near Eastern Studies,* 42**,** 245-264.

ZADOK, R. 1986. Archives from Nippur in the First Millennium BC. *In:* VEENHOF, K. R. (ed.) *Cuneiform Archives and Libraries.* Leiden: Nederlands Historisch–Archaeologisch Instituut te Istanbul, 278-288.

ZARINS, J. 2014. *The Domestication of Equidae in Third-Millennium BCE Mesopotamia,* Bethesda, ML, CDL Press.

ZARNKOW, M., A. OTTO & B. EINWAG 2011. Interdisciplinary investigations into the brewing technology of the Ancient Near East and the potential of the cold mashing process. *In:* SCHIEFENHÖVEL, W. & MACBETH, H. (eds.) *Liquid Bread: Beer and Brewing in Cross-Cultural Perspective.* Berghahn, 47-54.

ZARNKOW, M., E. SPIELEDER, W. BACK, B. SACHER, A. OTTO & B. EINWAG 2006. Interdisziplinäre Untersuchungen zum altorientalischen Bierbrauen in der Siedlung von Tall Bazi/Nordsyrien vor rund 3200 Jahren. *Technikgeschichte,* 73**,** 3-26.

ZEDER, M. A. 1991. *Feeding Cities: Specialized Animal Economy in the Ancient Near East,* Washington & London, Smithsonian Institution Press.

--- 1996. The role of pigs in Near Eastern subsistence: A view from the Southern Levant. *Retriveing the Past: Essays on Archaeological Research and Methodology in Honor of Gus W. van Beek.* Winona Lake, IN: Eisenbrauns, 297-312.

--- 2003. Food provisioning in urban societies: a view from northern Mesopotamia. *In:* SMITH, M. L. (ed.) *The Social Construction of Ancient Cities.* Washington DC: Smithsonian Books, 156-183.

--- 2006. A Critical Assessment of Markers of Initial Domestication in Goats (*Capra hircus*). *In:* ZEDER, M. A., BRADLEY, D. G., EMSHWILLER, E. & SMITH, B. D. (eds.) *Documenting Domestication: New Genetic and Archaeological Paradigms.* Berkeley, CA: University of California Press, 181-208.

--- 2008. Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. *Proceedings of the National Academy of Sciences,* 105**,** 11597-11604.

ZEDER, M. A., D. G. BRADLEY, E. EMSHWILLER & B. D. SMITH 2006. Documenting Domestication: Bringing Together Plans, Animals, Archaeology, and Genetics. *In:* ZEDER, M. A., BRADLEY, D. G., EMSHWILLER, E. & SMITH, B. D. (eds.) *Documenting Domestication: New Genetic and Archaeological Paradigms.* Berkely, CA: University of California Press, 1-12.

ZEDER, M. A. & B. HESSE 2000. The initial domestication of goats (*Capra hircus*) in the Zagros Mountains 10,000 years ago. *Science,* 287.5461**,** 2254-2257.

ZEEB, F. 2001. *Die Palastwirtschaft in Altsyrien,* Münster, Ugarit-Verlag.

ZETTLER, R. 1996. Written documents as excavated artifacts and the holistic interpretation of the Mesopotamian archaeological record. *In:* COOPER, J. S. & SCHWARTZ, M. (eds.) *The Study of the Ancient Near East in the 21st Century.* Winona Lake: Eisenbrauns, 81-101.

--- 2003a. Archaeology and the Problem of Textual Evidence for the Third Dynasty of Ur. *Bulletin of the Canadian Society for Mesopotamian Studies,* 38**,** 49-62.

--- 2003b. Reconstructing the World of Ancient Mesopotamia: Divided Beginnings and Holistic History. *Journal of the Economic and Social History of the Orient,* 46**,** 3-45.

ZETTLER, R. L. & N. F. MILLER 1995. Searching for Wine in the Archaeological Record of Ancient Mesopotamia of the Third and Second Millennium B.C. *In:* MCGOVERN, P. E., FLEMING, S. J. & KATZ, S. H. (eds.) *The Origins and Ancient History of Wine.* Luxembourg: Gordon & Breach, 123-132.

ZIEGLER, N. 2009. Die Westgrenze des Reichs Samsī-Addus. *In:* CANCIK-KIRSCHBAUM, E. & ZIEGLER, N. (eds.) *Entre les fleuves - I: Untersuchungen zur historischen Geographie Obermesopotamiens im 2. Jahrtausend v. Chr.* Gladbeck: PeWe-Verlag, 181-211.

--- 2011. Iddin-Dagan, un gestionnaire à Ṭábatum. *Revue d'assyriologie et d'archéologie orientale,* 105**,** 17-34.

ZIMANSKY, P. 2004. Archaeology and Texts in the Ancient Near East. *In:* POLLOCK, S. & BERNBECK, R. (eds.) *Archaeologies of the Middle East: critical perspectives.* London: Blackwell,

ZIMMERMANN, A., J. HILPERT & K. P. WENDT 2009. Estimations of Population Density for Selected Periods Between the Neolithic and AD 1800. *Human Biology,* 81**,** 357-380.

ZOHARY, D., M. HOPF & E. WEISS 2012. *Domestication of Plants in the Old World,* Oxford, Oxford University Press.

ZOHARY, D. & P. SPIEGEL-ROY 1975. Beginnings of Fruit Growing in the Old World. *Science,* 187**,** 319-327.

ZOHARY, M. 1973. *Geobotanical Foundations of the Middle East,* London, Taylor & Francis.